VOLUME XLV NUMBER FIVE

The NATIONAL GEOGRAPHIC MAGAZINE

MAY, 1924

CONTENTS

SPECIAL SUPPLEMENT
MAP OF NORTH AMERICA IN SIX COLORS
(Size, 38 x 28½ inches)

Surveying the Grand Canyon of the Colorado
With 63 Illustrations — LEWIS R. FREEMAN

East and West in America
16 Full-Page Duotone Illustrations

The Isthmus of Tehuantepec
With 25 Illustrations — HERBERT COREY

The Society's Map of North America

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

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TO carry out the purposes for which it was founded thirty-six years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

THE Society also is maintaining expeditions in the unknown area adjacent to the San Juan River in southeastern Utah, and in Yunnan, Kweichow, and Kansu, China—all regions virgin to scientific study.

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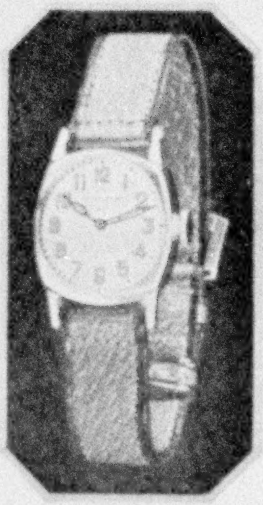

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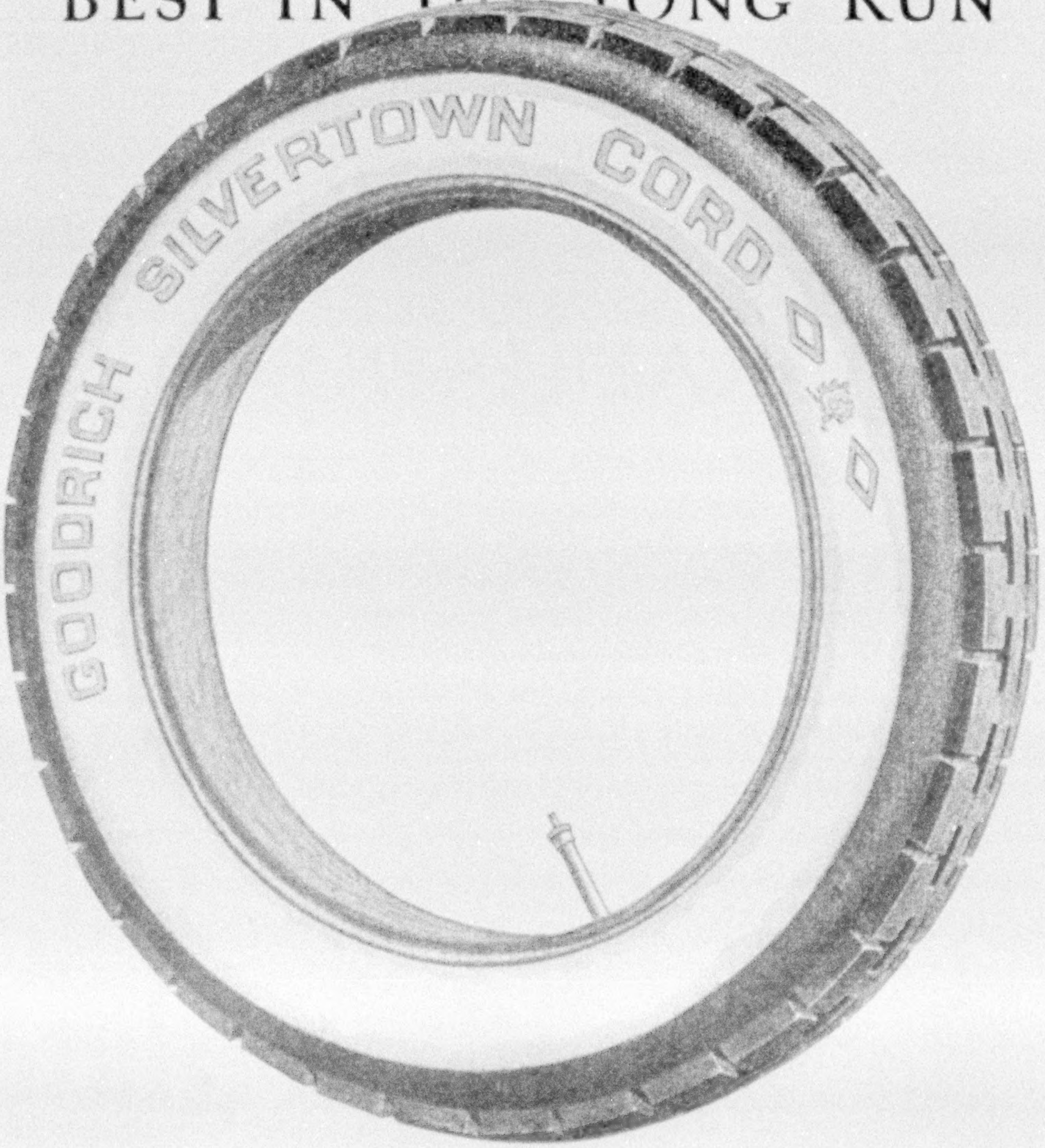
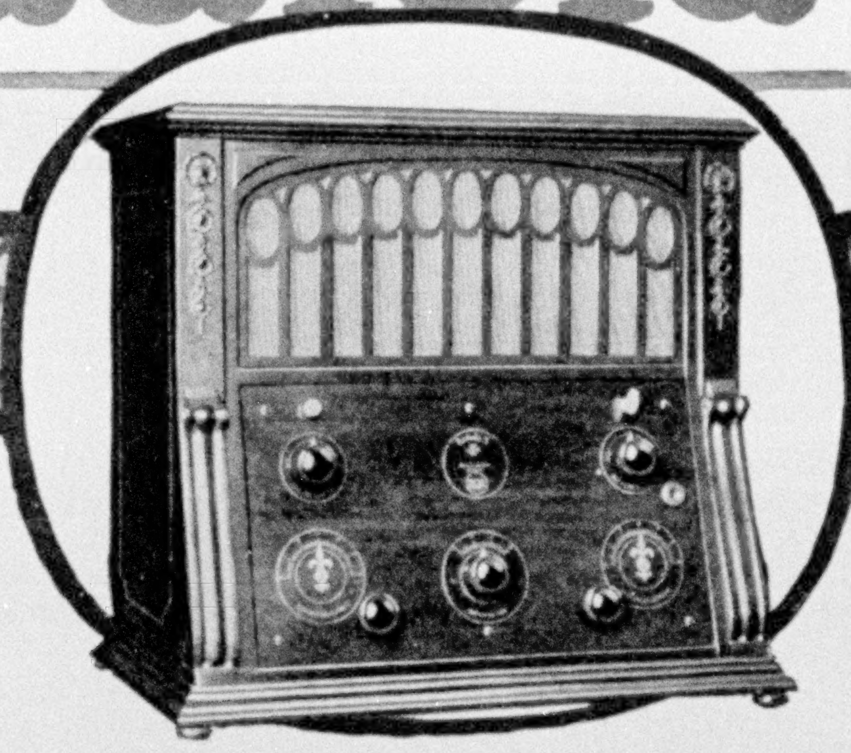


OUR RESEARCH DEPARTMENT INVITES SUGGESTIONS FOR NEW USES OF RUBBER

Radiola X



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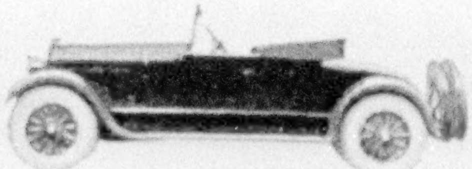
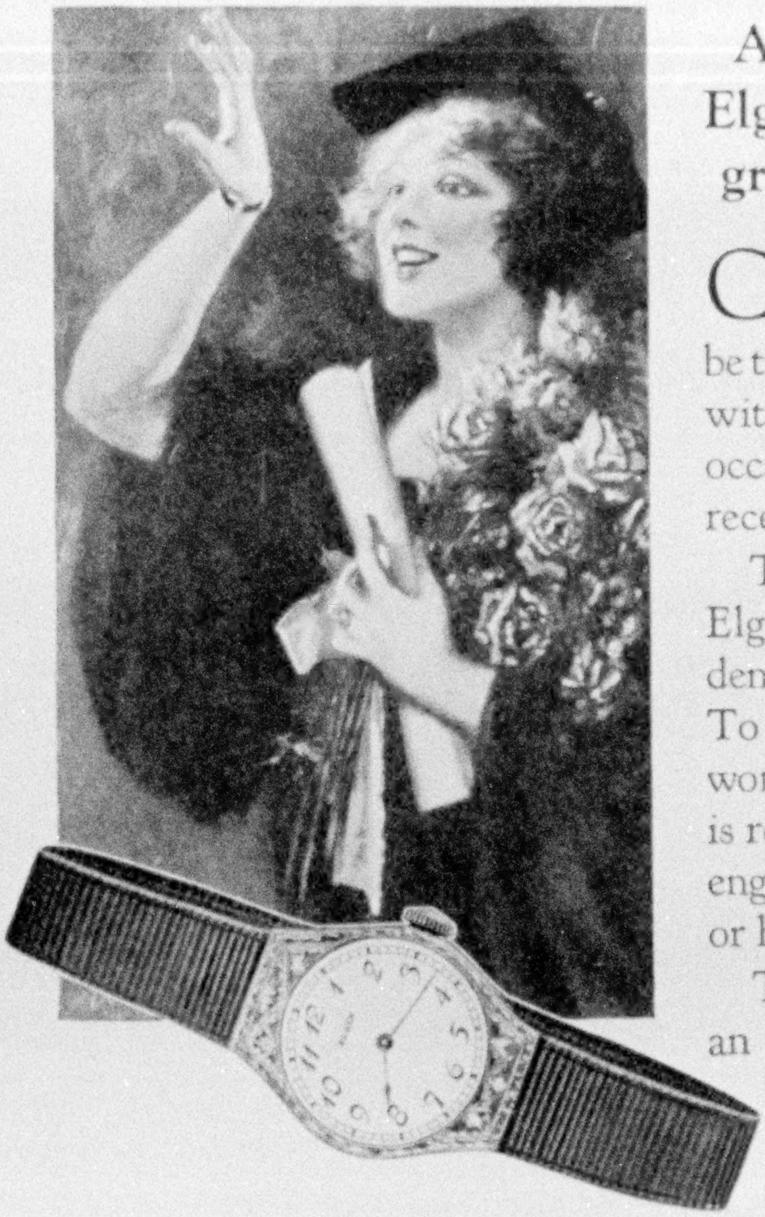


Cadillac V-63 Roadster



Your Jeweler is ready to show you a complete assortment of Women's Wrist Watches for graduation or wedding gifts. Elgin Wrist Watches, cased in Gold, Jewel-set and Gold-filled, may be had at a wide range of prices.

Appreciation of an Elgin Gift Watch will grow as Time Passes

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Through three generations Elgin Watches have gladdened the hearts of graduates. To many a grown man and woman the joy of school days is recalled by the inscription engraved on the inside of his or her watch case.

Truly, the appreciation of an Elgin Gift Watch grows with the passing of the years.

One way to be certain about your watch is to select from the Elgins at your Jeweler's.

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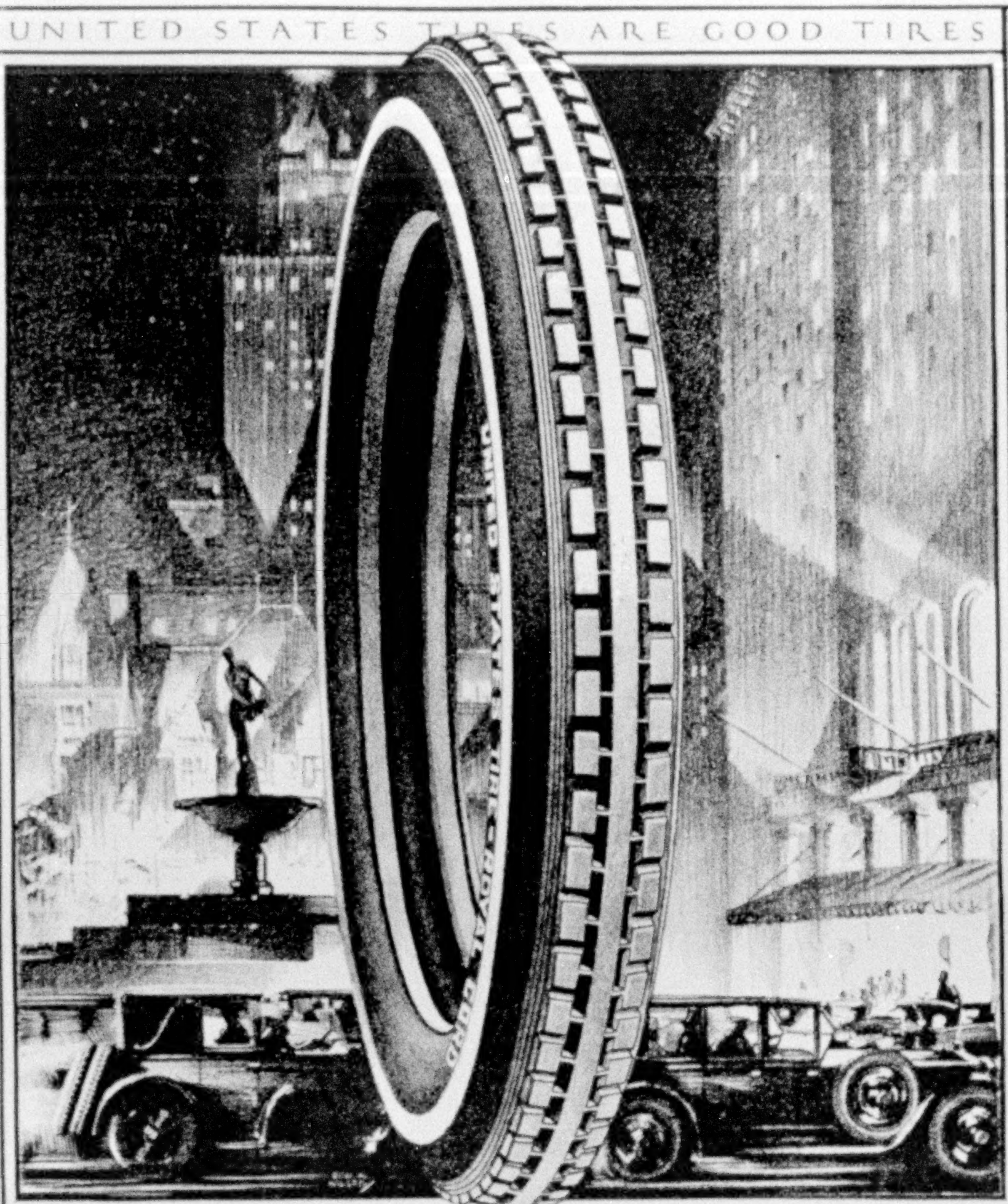
The Professional Timekeeper

ELGIN NATIONAL WATCH COMPANY · ELGIN, U. S. A.

UNITED STATES TIRES ARE GOOD TIRES

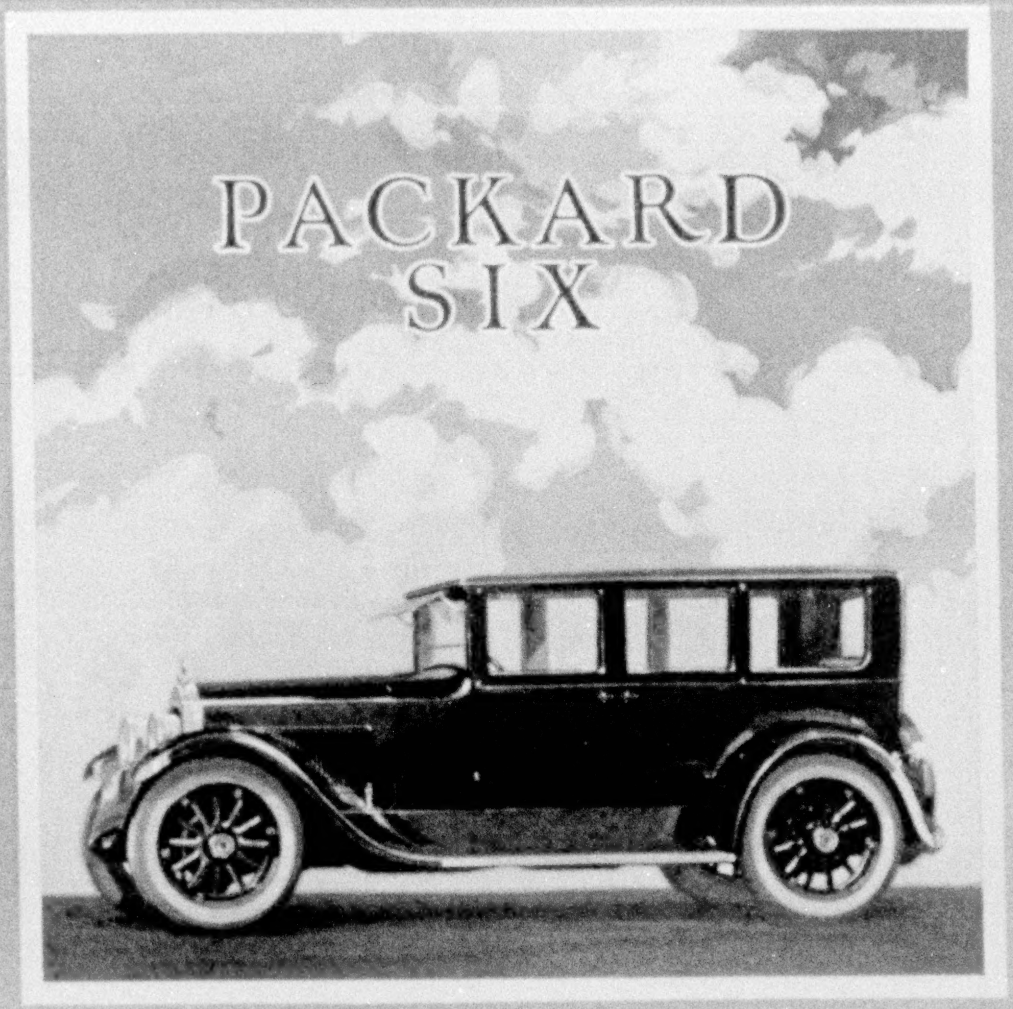


The "Royal" road is any road today—Fifth Avenue—"Main Street" or the country highway and byway. The service that Royal Cords are giving on all types of cars is so truly remarkable that owners who are first attracted by their fine appearance soon come to appreciate even more the beauty of their utility.

Trade Mark

United States Rubber Company

U.S. Royal Cords



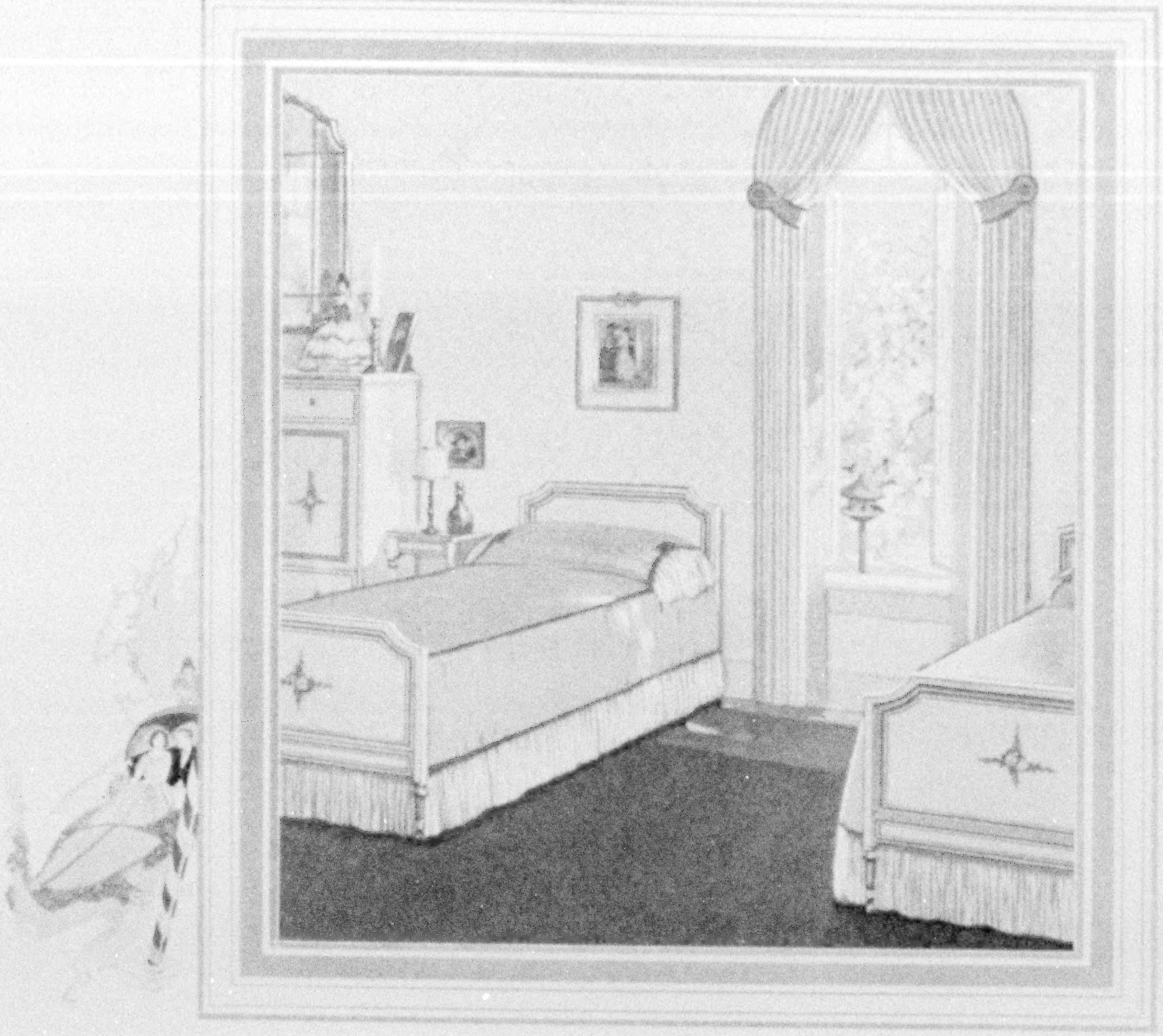
ONLY PACKARD CAN BUILD A PACKARD

Those who possess a fine sense of discrimination are instantly appreciative of the distinctive smartness and sense of well-being which attach to Packard ownership.

In the Packard they experience the complete confidence which can come only from the realization of sound investment, entire dependability, luxurious comfort and superior performance.

Experienced motorists seem to prize the luxuries of the Packard Six more highly because they are procurable at lower ultimate cost than the substitute offered by cars which sell for even one thousand dollars less.

Shown above is the Packard Six Five-Passenger Sedan. Packard Six furnished in eleven popular body types, open and enclosed



"Use two beds," said Ben Franklin, "if it is hard to sleep"

In his pamphlet on sleep, the great American who was counted the wisest man of his age, advised the use of two beds by light sleepers, changing if they awoke.

Scientist and keen observer, Franklin knew that comfort is the first essential for sound sleep, while the bedding of his time fell a long way short of comfort.

That was before the building of luxurious springs and mattresses had become a fine art and a factory process. Millions get more rest from one set of Simmons sleep equipment than Franklin ever secured from two.

Don't be satisfied with your own bedding until you compare it with the luxurious Simmons springs and mattresses you can find at any leading furniture store.

There are many types to choose from. The price of each is the lowest at which bedding of safe, *clean, new materials* can be built or sold. Go and see them today.

The rich soft rose of curtains and bed covers floods this interesting chamber with cheerful color. Materials may be linen taffeta, Burma or Alyth cloth, plain linen or chambray. The flounces of covers and bolsters are of silk taffeta. Wall in two tones of warm cafe au lait. Note the high draping of the curtains at the French windows. Rug is plum or heliotrope chenille or wilton. French prints. Queen Anne mirror. Brass candlesticks and lamp. Beds, chifforette and table from a complete new suite of Simmons furniture, in pearl gray, blue and darker gray. Supplied also in ivory and finishes reproducing walnut and mahogany. Bed is Design 1829. For nine other interesting schemes of decoration, write for "Restful Bedrooms" to The Simmons Company, 1347 South Michigan Avenue, Chicago, or to Simmons Limited, 400 St. Ambroise Street, Montreal, Quebec.

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Beds · Mattresses · Springs: Built for Sleep
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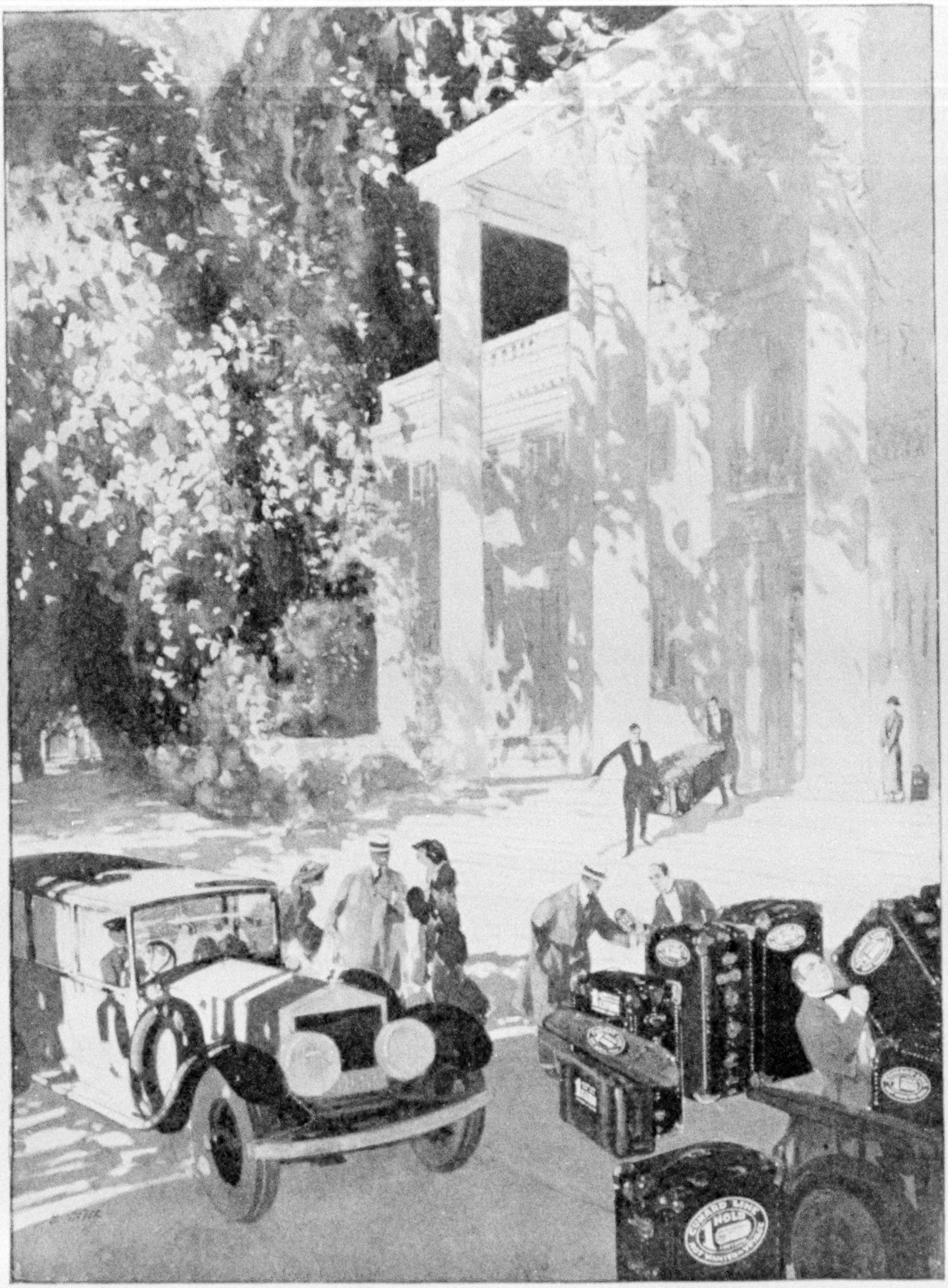
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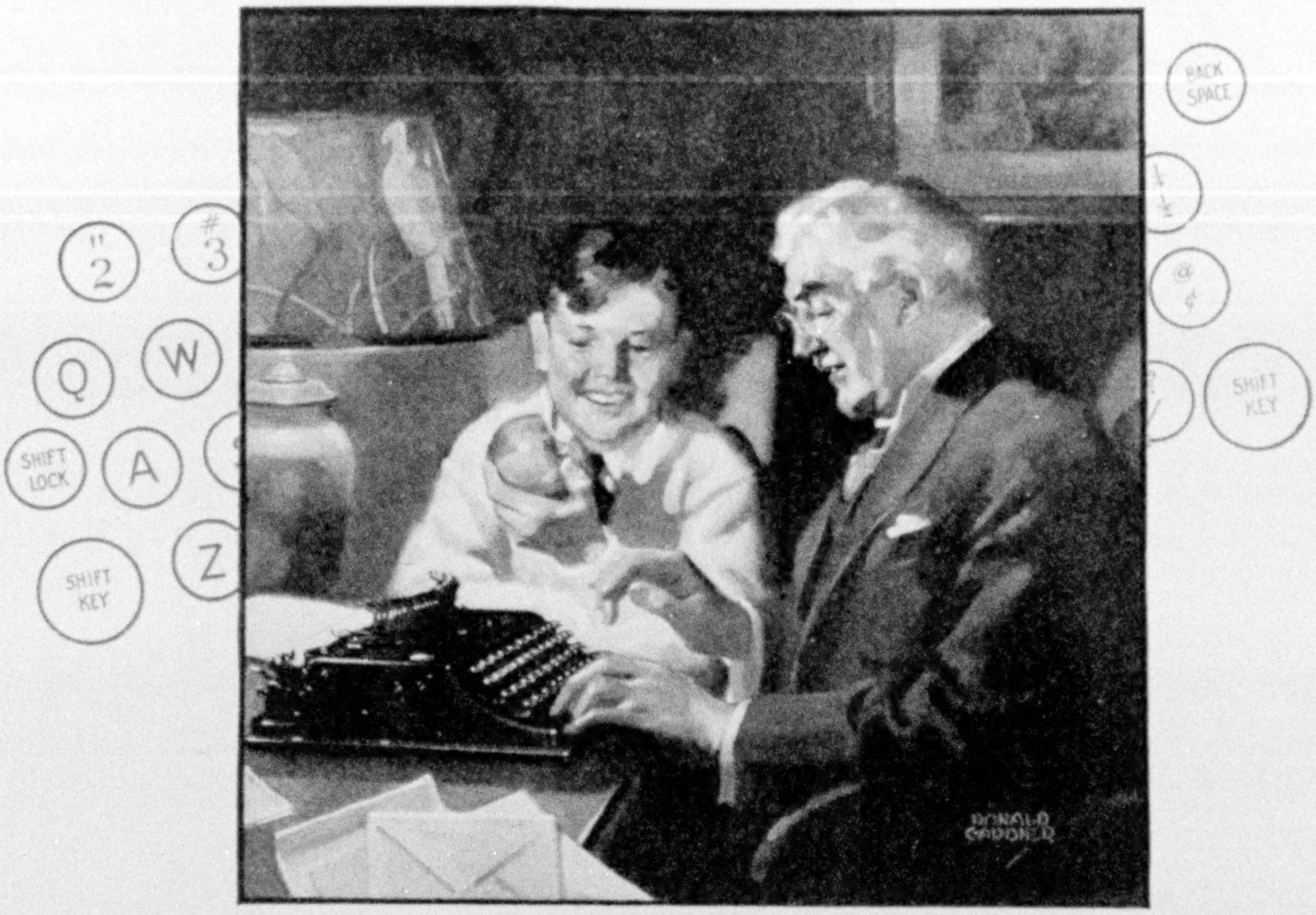

Easy to Learn~Easy to Operate

The Remington Portable is easy to learn because it has the one and only standard keyboard, with four rows of keys and no shifting for figures—exactly like the big machines — the keyboard universally adopted by business as the best.

It is easy to operate because it is the most complete portable typewriter, with every feature common to the larger machines. So light it can be carried anywhere, so convenient it can be used anywhere, and so small that it fits in a case only four inches high. It is compact, strong and durable. And its work is beautiful — always.

Remington branches and dealers everywhere sell the Remington Portable. Use it as you pay, if you wish.

Ask for a demonstration, or write for illustrated "For You—For Everybody". Address Department 65.

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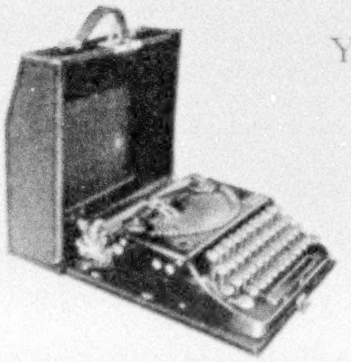
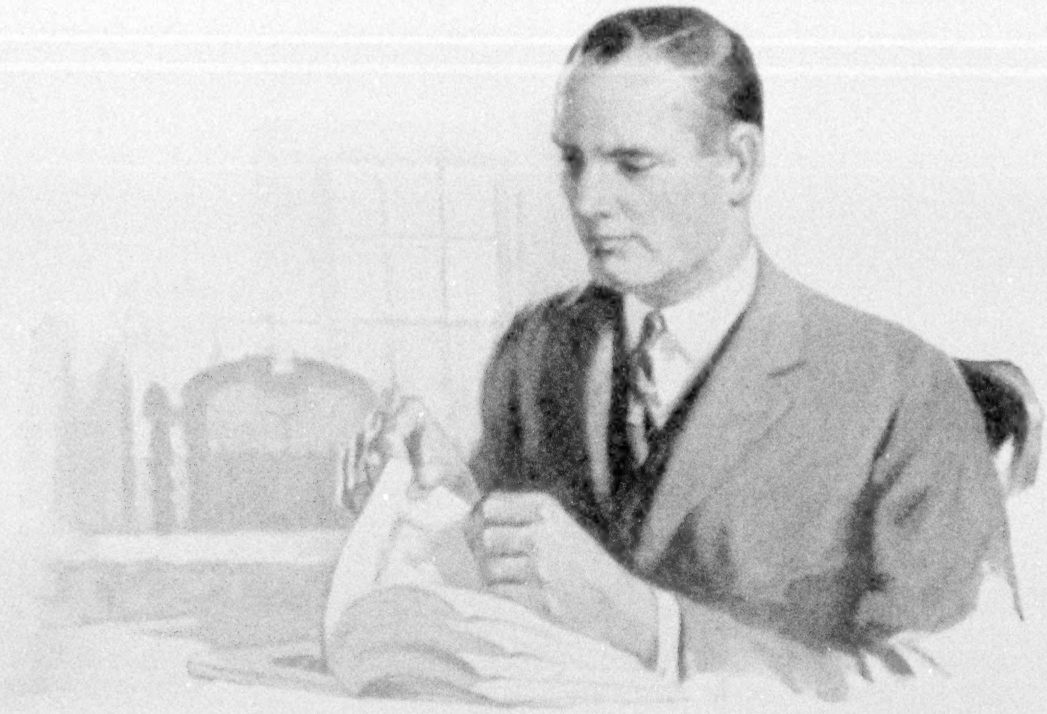
Main Office, 68 King Street West, Toronto

Remington Portable

THE RECOGNIZED LEADER—IN SALES AND POPULARITY



FACTS ABOUT A FAMOUS FAMILY



"How much is a thousandth of an inch?" you ask. It's about one-third the thickness of this page.

A very precise family

This will give you some idea of what General Motors means by *accurate craftsmanship.*

In the manufacture of just one of its cars there are 37,000 extremely fine precision operations. Think of it—37,000 measurements of less than 2 one-thousandths of an inch!

Such craftsmanship produces a car which combines the accuracy of a watch with the strength of a locomotive—and this combination of accuracy and strength is an ideal which holds throughout the General Motors family.

GENERAL MOTORS

Buick · Cadillac · Chevrolet · Oakland
Oldsmobile · GMC Trucks

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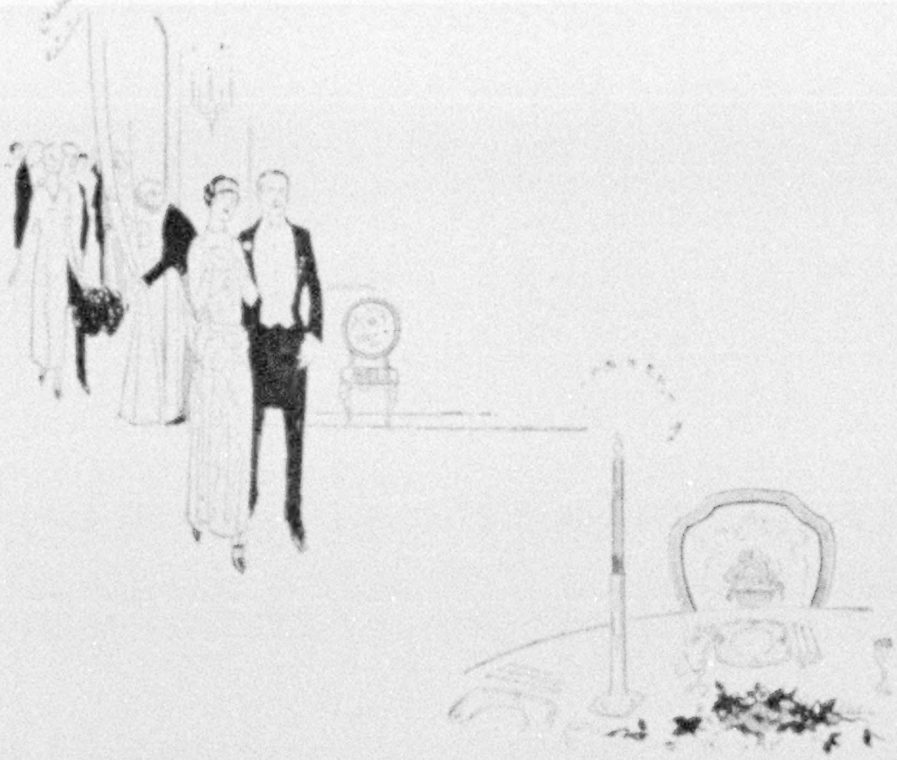
THE FIRST PICTURE IN THE DINING ROOM



SCENE: Dinner is announced. The living-room assemblage, still gaily chatting, moves toward the dining-room. Back go the portieres. A momentary hush; the guests pause on the threshold.

It is a dramatic moment. The hostess feels her heart aflutter.

Every eye goes straight to the dinner table. Of the dining-room itself, none seems aware. The table resolves itself into some detail,—a cover. The cover into a service-plate, framed, on either side, with silver.

* * *

The ensemble of a table set with the Trianon Service is one of sheer splendor. Its details compose into pictures, lovely in atmosphere.

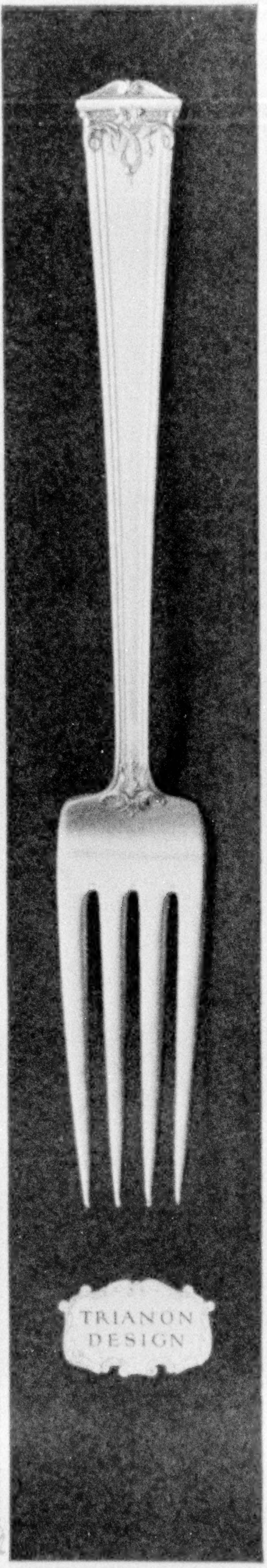
Trianon's lines are straight,—strong,—massive. Its proportions are classic. Thus far, the essence of simplicity.

But, crowning each piece is a French Renaissance ornamentation,—exquisitely designed,—exquisitely wrought. This is the touch magnificent.

Thus, in Trianon, is simplicity, yet also magnificence,—cultivated taste, yet also richness. A modern dinner service, done in sovereign style in solid silver, the sovereign metal.

To visualize the possibilities in a Trianon Service, one must see actual pieces, handle them, study them. Your jeweler can arrange for you to do this.

The book of the Trianon Service will also help. Sent without charge upon request. Address Dept. 2-85, International Silver Company, Meriden, Conn.



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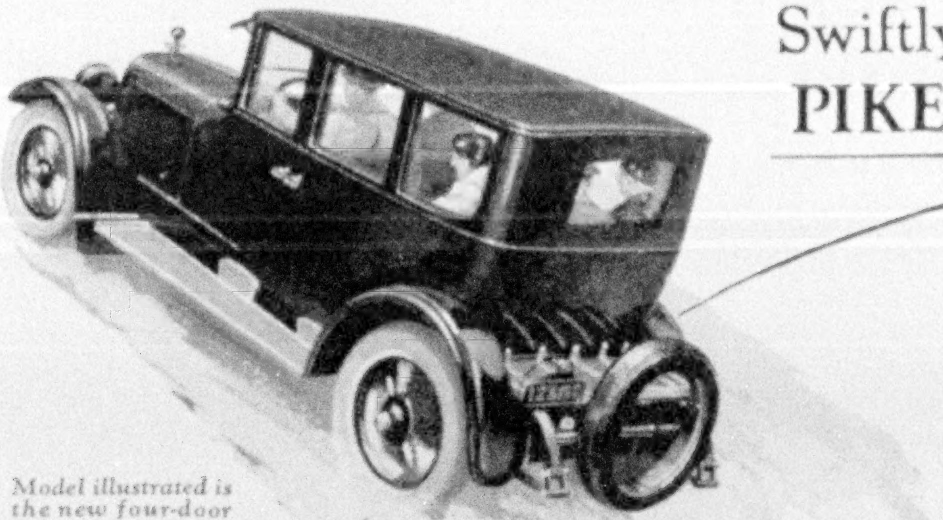


Model illustrated is the new four-door five-passenger sedan, $1895, f. o. b. Cleveland.

Swiftly up with the PIKES PEAK MOTOR

WHETHER your problem is to pull the long, hard climb in high gear, or to descend the sharp down grade with sure-footed safety

—a Chandler is the only answer!

The Pikes Peak Motor made Chandler the national performance champion—a matchless conqueror of hills, fleet and brilliantly responsive in traffic.

The Traffic Transmission, with nothing new to learn for its operation, overcomes all clashing of gears and permits any driver to make a split-second, silent change to any speed at any time.

Facile handling in traffic is assured. Skidding dangers are eliminated. The instant use of the motor as a positive brake on hills becomes a certainty.

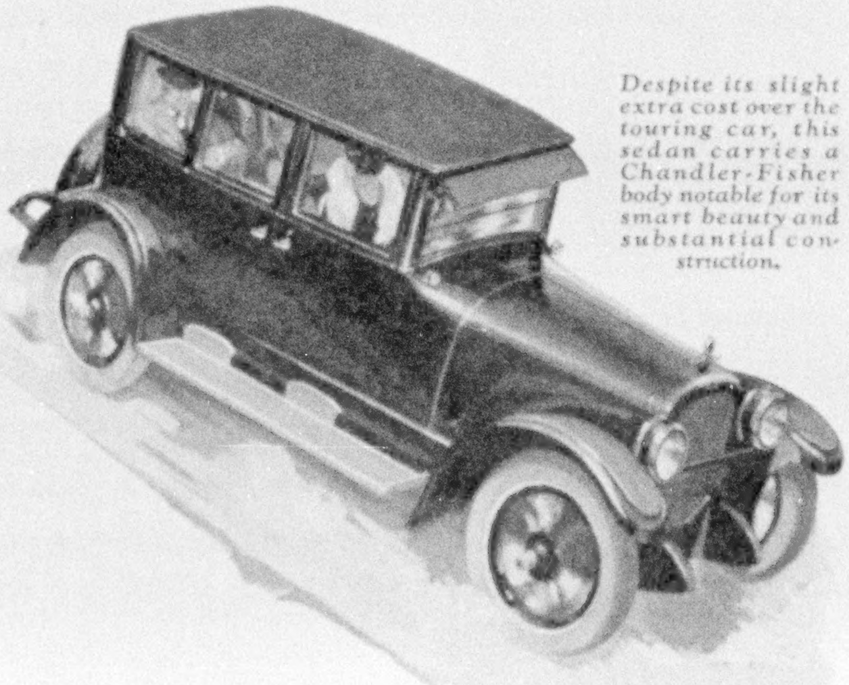
Only Chandler offers this master performance combination of invincible motor and infallible transmission.

We urge you to arrange for a demonstration drive. It will be a revelation.

THE CHANDLER MOTOR CAR COMPANY · CLEVELAND
Export Dept., 1819 Broadway, New York City Cable Address "Chanmotor"

Safely down with the TRAFFIC TRANSMISSION

(The Traffic Transmission is built complete in the Chandler plant under Campbell patents.)



Despite its slight extra cost over the touring car, this sedan carries a Chandler-Fisher body notable for its smart beauty and substantial construction.

CHANDLER

THE CAR OF THE YEAR

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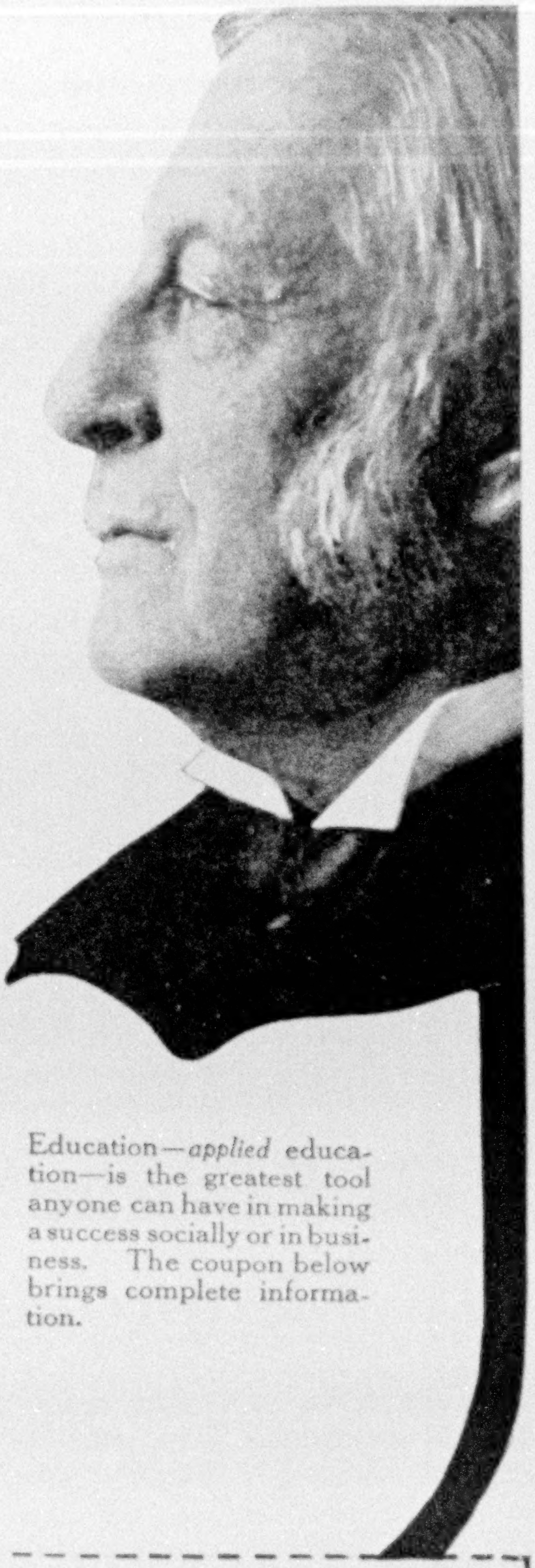
Your reading problem solved by Dr. Eliot of Harvard



THERE will be a dozen competitors for your big opportunity when it comes. What will influence the man who is to make the decision among them?

"In every department of practical life," said ex-President Hadley of Yale, "men in commerce, men in transportation, and in manufactures have told me that what they really wanted from our colleges was men who have *this selective power of using books efficiently.*"

Not book-worms; not men who have read all kinds of miscellaneous books. Not men who have wasted their whole leisure time with the daily papers. But those who have read and have mastered the few great books that make men think clearly and talk well.

What are those few books? How shall a busy man find them? The free book offered below answers those questions; it describes the plan and purpose of

Dr. Eliot's Five-Foot Shelf of Books

The books that make men think straight and talk well

Every well-informed man and woman should at least know something about this famous library.

The free book tells about it—how Dr. Eliot has put into his Five-Foot Shelf "the essentials of a liberal education," how he has arranged it that even "fifteen minutes a day" are enough, how in pleasant moments of spare time, by using the reading courses Dr. Eliot has provided for you, you can get the knowledge of literature and life, the culture, the broad viewpoint that every university strives to give.

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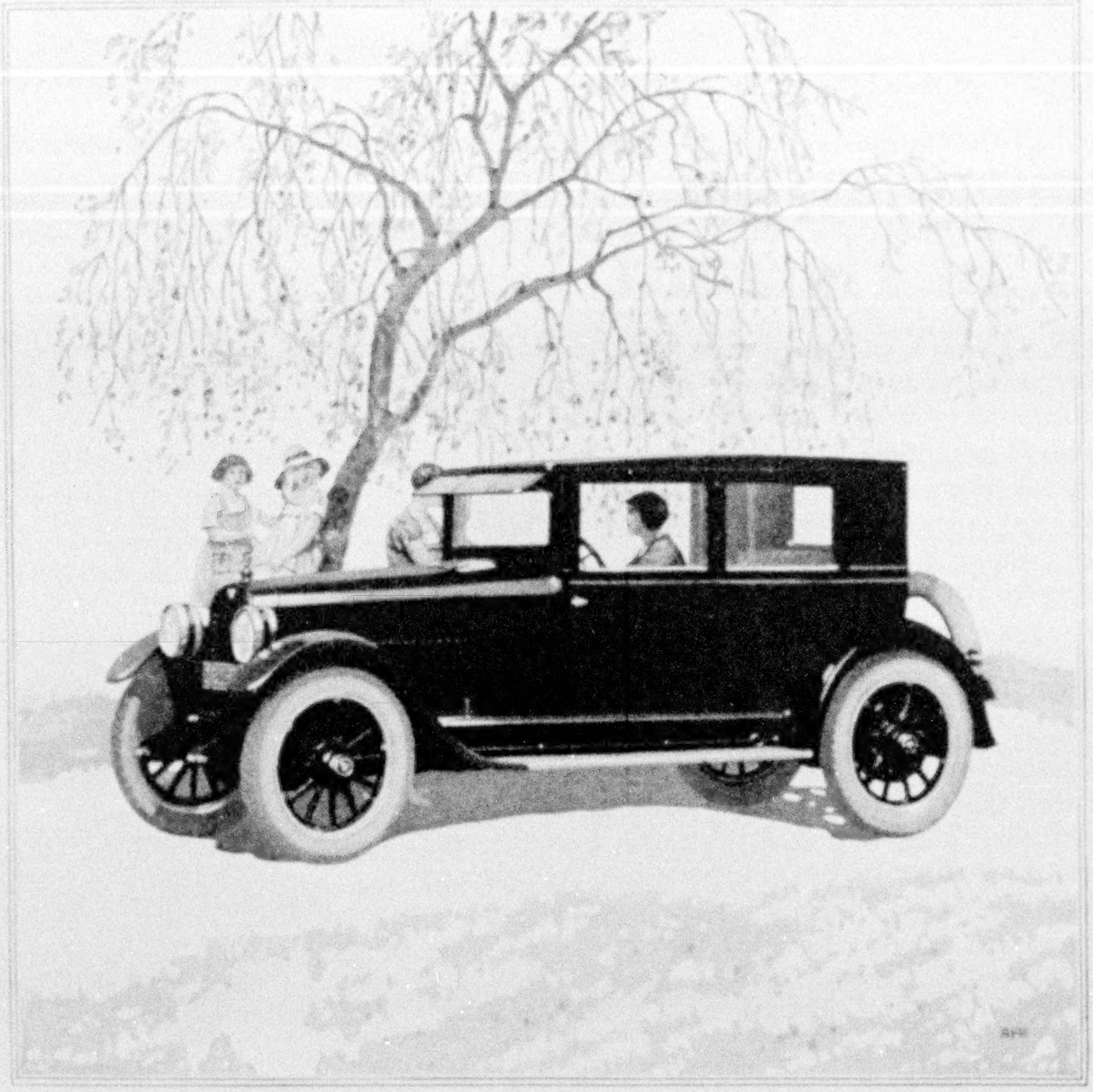

This Favorite Super-Six Improved In All Ways

The attractions of a more beautiful and comfortable body, with the greatest Super-Six chassis ever built, are combined in the new Hudson Coach.

Also unmatched price advantage. At $1550 it costs but little more than open models. Yet it provides the wanted comforts, distinction and all-season utility of a fine closed car.

Motordom concedes that no car excels Hudson in performance reliability and long life at low maintenance.

Now, to those famous qualities are added refinements that assure prompt starting in coldest weather, as well as greatly increased gasoline and oil economy.

Is it any wonder that the new Coach has met a reception surpassing any Hudson ever built?

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Coach
$1550

New Models

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7-Pass. Phaeton	1500
Sedan	2145

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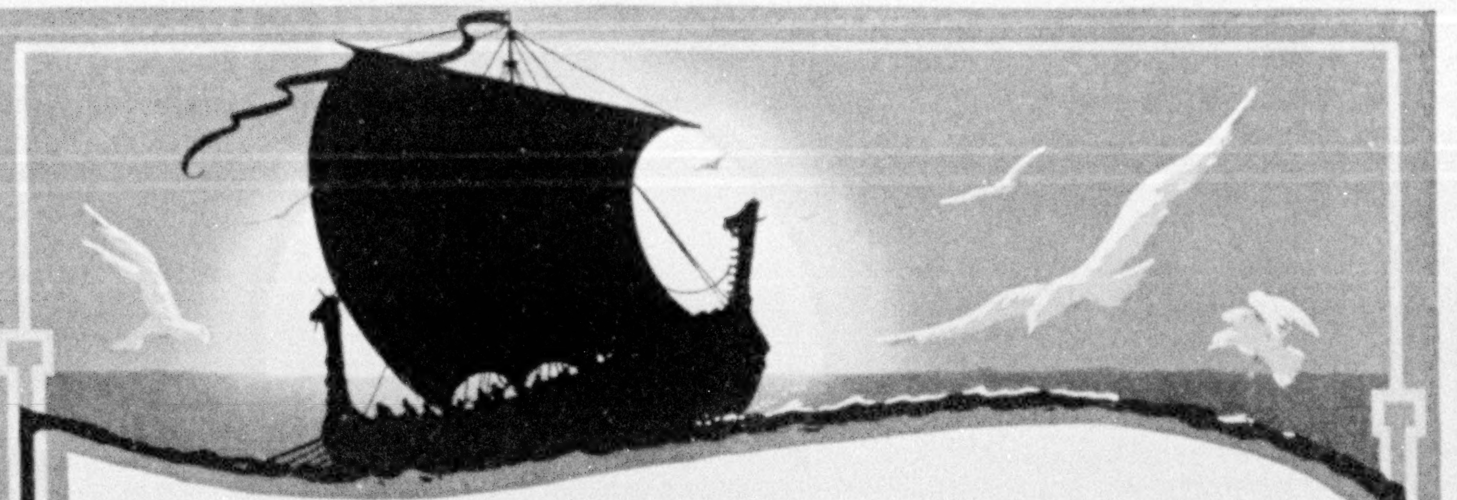

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Midnight Sun Cruise

From New York, June 26 — Southampton July 21
on the Cunard S. S. "Franconia" (20,000 tons)

This most wonderful of summer voyages, visits one of Earth's most thrilling regions — Iceland, the towering North Cape and Norway's famous fjords. Better than any other travel company we know the route and its attractions. The new Cunarder "Franconia" is the largest and most palatial liner ever to cruise to Scandinavia. We will gladly send Cruise Booklets and Deck Plans, detailing the route, accommodations and rates.

Europe this Summer

Our usual splendid series of tours will visit all countries in western Europe.
Automobile tours through England and Scotland; also Switzerland.
Persons who prefer to travel without escort or to follow some special route will find assurance of a successful trip in our **Individual Travel Service.**

Round the World

The Raymond-Whitcomb Tours (leaving in September and October and lasting from 6 to 8 months) are more comprehensive than ever before. To the usual visits they add Cambodia (for the great Angkor Wat), Siam, and wonderful Cashmere. One trip will visit the South Sea Islands, New Zealand, Australia, South Africa and the Sudan.

A Cruise Around South America

The third Raymond-Whitcomb Cruise on the S. S. "Resolute" will encircle South America, visiting Cuba, Colombia, Panama, Ecuador, Peru (with a trip to Bolivia), Chili, the Straits of Magellan, the Argentine Republic (with an Optional Trip to the spectacular Iguazu Falls in Paraguay), Uruguay, Brazil and the Amazon, Trinidad, Venezuela and Porto Rico. This is the first opportunity ever offered to visit on a single trip every South American Republic. Sailing January 24, 1925.

Mediterranean Cruise

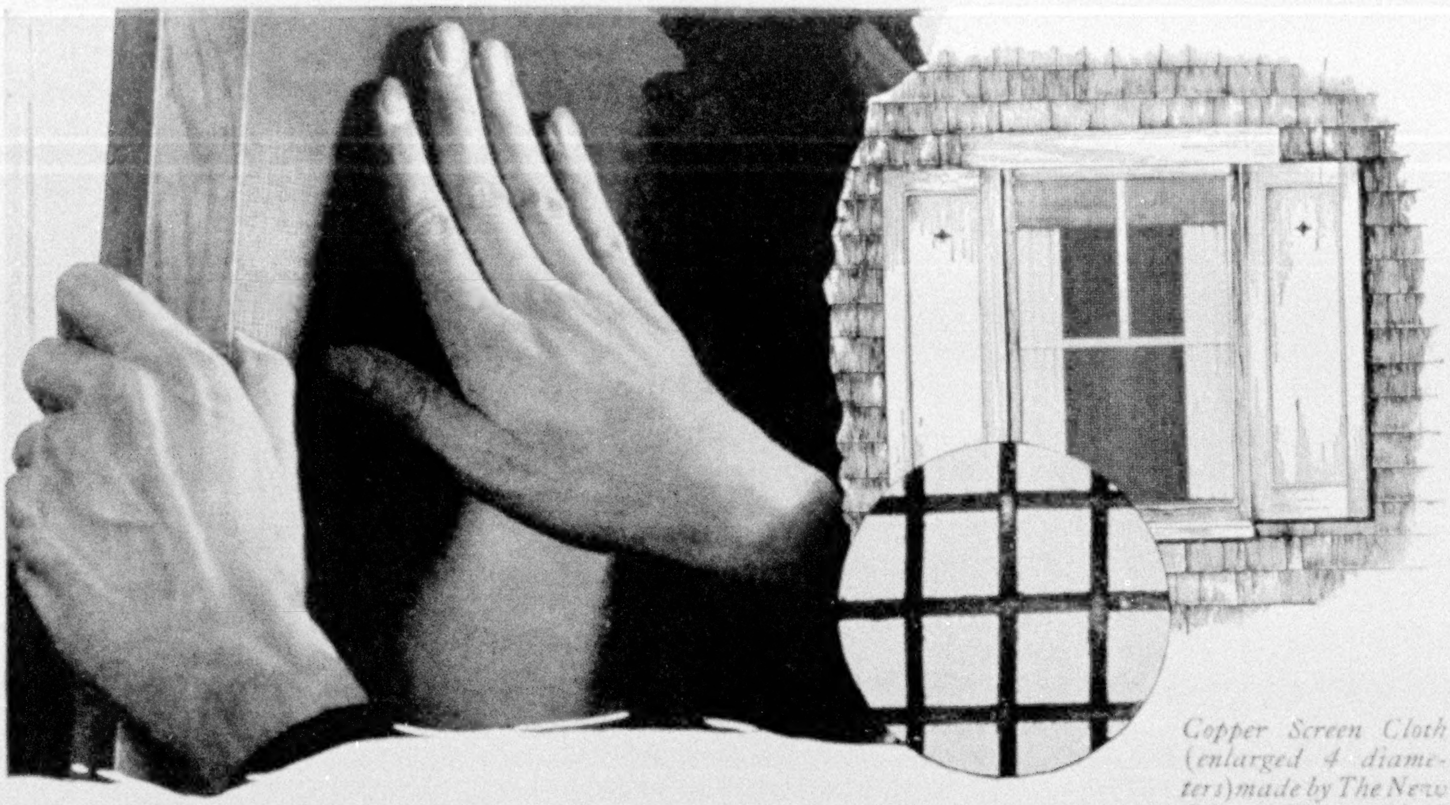
The most complete Mediterranean Cruise in recent years, including, in addition to the usual ports, Nice (for the famous Carnival) and Venice. Sailing Feb. 5, 1925 on the great Cunard liner "Samaria".

Tours to the Pacific Coast, Alaska, Japan and China
Round the World Cruise — January 16, 1926

Booklets describing any Cruise or Tour will be sent upon request

Raymond & Whitcomb Co.

Beacon & Park Streets — Boston, Massachusetts



Copper Screen Cloth (enlarged 4 diameters) made by The New Jersey Wire Cloth Company, which has been subjected to the action of salt air for more than twelve years.

A Copper Screen Cloth That Will Not Stretch

There is an idea in the minds of many people that copper wire makes a "soft" screen cloth that will stretch and bulge.

This is not true of Jersey.

Though it is made of copper 99.8% pure—the most durable metal in common use—it has a stiffness and strength comparable to that of steel cloth. This is due to a special Roebling process which is applied exclusively to the wire used in making Jersey Copper Insect Screen Cloth.

When you buy screen cloth look for the Jersey tag at the end of the roll. It is your guarantee that you are getting genuine Jersey—the stiff and strong copper screen cloth.

If your hardware merchant or custom-made screen maker cannot supply Jersey, write us and we will send samples, an interesting booklet and tell you how to obtain it.

THE NEW JERSEY WIRE CLOTH COMPANY
632 South Broad Street
Trenton New Jersey

TRADE JERSEY MARK

Copper Screen Cloth

Made of Copper 99.8% Pure

XUM

© Arco, 1924

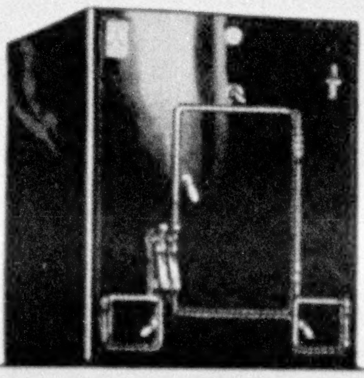
LOVELY—*but will the guests stay?*

THE architect and the decorator have done their best. The room is "correct," "in good taste."

But all these virtues are not enough. To have an atmosphere of welcome, a *subtle something else* is necessary. That subtle something is supplied by a modest servant in the cellar. His name is "IDEAL" and the warmth he sends through American Radiators changes houses into homes. It makes a mere room a *human* place in which to laugh and linger.

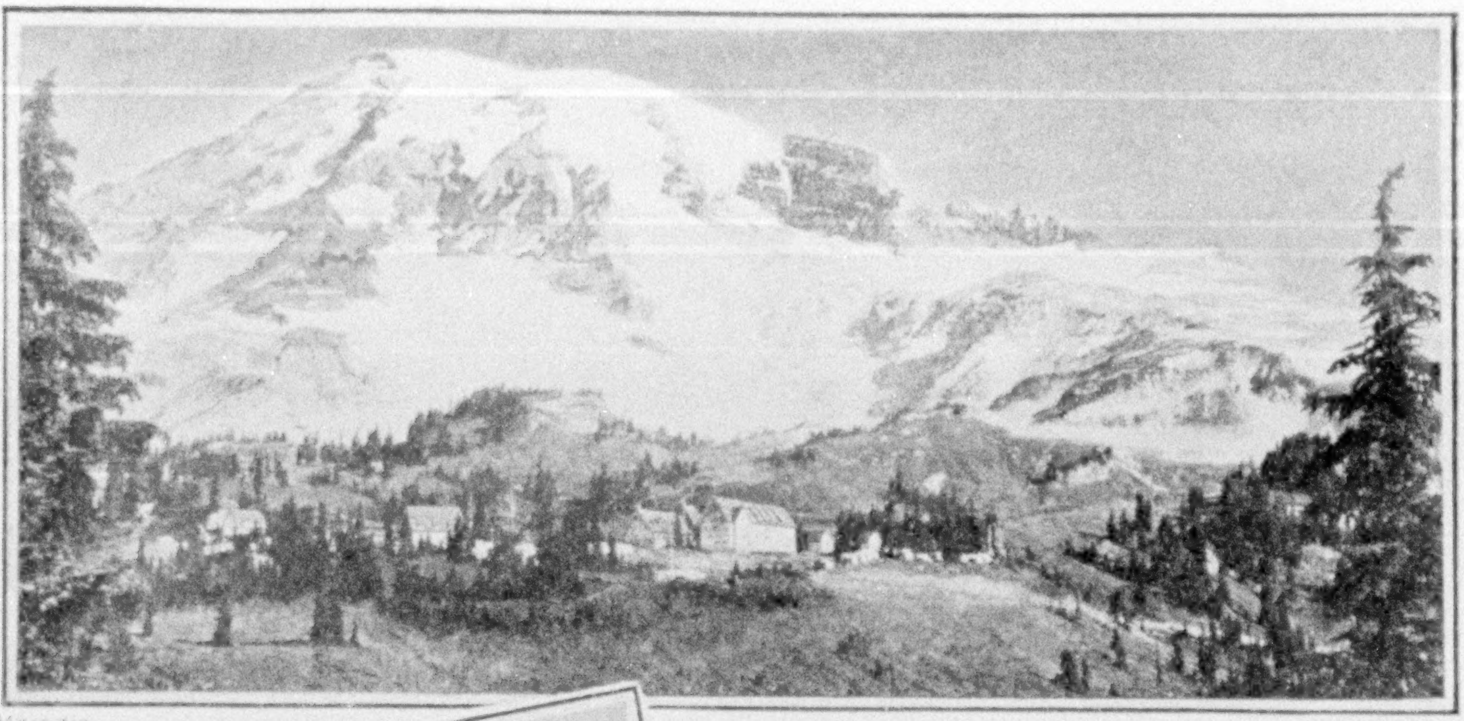
Wouldn't you like to trade your old heating plant for this IDEAL Boiler? You can. For IDEAL TYPE A pays back its cost in the fuel it saves. Write to the office below for the book that tells how.

IDEAL TYPE A

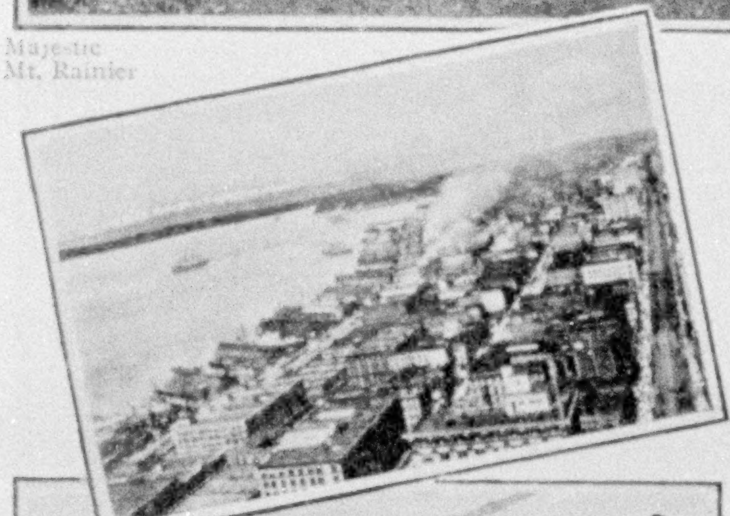


IDEAL BOILERS
COAL · OIL · GAS
and AMERICAN RADIATORS
save fuel

AMERICAN RADIATOR COMPANY
Your Heating Contractor is our Distributor
Dept. 105, 1803 Elmwood Ave., Buffalo, N. Y.
Branches in all principal cities



Majestic Mt. Rainier



SEATTLE—city of a great vacation land

SEATTLE, fascinating city on picturesque Puget Sound, offers incomparable vacation delights in a cool evergreen playground of amazing scenic wonders, with a mild, invigorating climate the year round.

Here you will find all the recreational advantages and an interesting, expanding, metropolitan Western city, whose one generation's growth to world-city stature is an epoch in American enterprise.

Seattle will surprise you and you will stay longer than you expect to. Most visitors here for the first time do.

You have never seen such a country for motoring, golfing, fishing, yachting, steamer trips, mountain climbing, surf bathing. No matter what your sport or recreation is, it is found in the "Charmed Land." Cool days and refreshing nights, the tang of the sea, the ozone of the mountains, the fragrant balsam of the forests, new scenes and new people—will send you home refreshed. Rainless days are the rule in this surpassing summer land.

Annual Rainfall
[in inches]
U. S. Weather Bureau

SEATTLE	33
CLEVELAND	35
ST. LOUIS	37
KANSAS CITY	37
PHILADELPHIA	41
BOSTON	43
NEW YORK	44

Average summer temperature 62
Average winter temperature 41

An outing in the snow fields and the hundreds of extravagantly beautiful Alpine flowers on Mount Rainier, whose glacial system exceeds all the glaciers in Switzerland combined, inspires and rejuvenates.

All these joys are but a few hours from your hotel. There is radiant health here. Seattle is America's healthiest large city. Come to the Land of Content. It is your heritage as well as ours.

Our Hospitality Bureau will help plan your vacation upon your arrival. Make it a family vacation. Come prepared to spend a month or longer, with something new to see and enjoy every day.

Low round-trip excursion fares, May 15 to September 30. See that your ticket to any part of the Pacific Coast reads "via Seattle." If you plan a voyage to the Orient, Honolulu or Alaska, let us assist you.

The 36-page, illustrated "Charmed Land" booklet describes and pictures Seattle, America's healthiest city and America's Summer Playground. Write the Chamber of Commerce, 900 Arctic Building, Seattle, Washington, for your copy.

SEATTLE—*Metropolis of the Pacific Northwest*

THESE ADVERTISEMENTS PAID FOR BY SEATTLE CITIZENS, WHO INVITE YOU TO SEE *"The Charmed Land"*

The Pacific Northwest

WASH.
MONTANA
OREGON
IDAHO
WYOMING
Burlington Route
NORTHERN PACIFIC
GREAT NORTHERN RAILWAY
GLACIER NATIONAL PARK

Come to America's greatest vacationland

Come this summer to the American Wonderland. Join the thousands of veteran tourists who every year return here to enjoy the most gorgeous variety of natural grandeur on the continent.

Whatever your idea of a perfect vacation—you will find it in the Pacific Northwest. Here are five of the nation's premier scenic attractions:

Yellowstone National Park
Glacier National Park
Rainier National Park
Crater Lake National Park
The Alaskan Tour

Here is beauty indescribable, in a thousand forms—everywhere. The climate is balmy, sunshiny, spiced with sea or mountain breezes. The motor roads are wonderful. Golf courses are numerous and as fine as you ever played. You will like the Pacific Northwest's friendly, modern cities. The best hotels await you everywhere.

The Burlington-Northern Pacific-Great Northern Travel Bureau will help you plan your vacation. It will tell you where to go, what to see, and how to make the most of your time. It will give you details as to the cost. And, if you are going to any other point on the Pacific Coast, it will tell you how to plan your trip so as to include the Pacific Northwest.

Write for free booklet

The free booklet, "The American Wonderland," tells you in words and pictures all about the unrivaled vacation possibilities of Washington, Oregon, Idaho, Montana and Wyoming—the Pacific Northwest. It's free. Fill in the coupon and send for it now.

P. S. Eustis, *Pass. Traffic Mgr.,*
Chicago, Burlington & Quincy R. R.
A. J. Dickinson, *Pass. Traffic Mgr., Great Northern Ry.*
A. B. Smith, *Pass. Traffic Mgr., Northern Pacific Ry.*

The Chicago Burlington & Quincy R.R.
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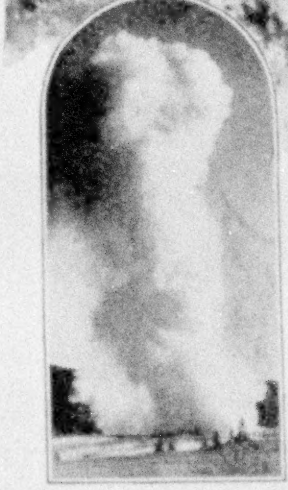


© by Haynes, St. Paul
Old Faithful Geyser, Yellowstone National Park

86
round trip from Chicago to North Pacific Coast destinations.

Roundtrip from St. Louis $81.50

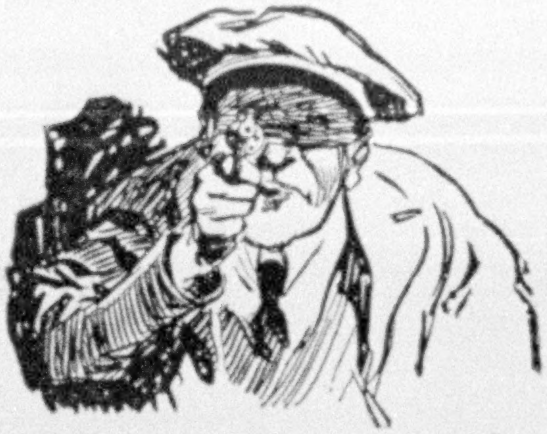
An unforgetable drive, Columbia River Highway

Coupon

Travel Bureau, Dept. 27-B
1403 Burlington R. R. Bldg., Chicago, Ill.
Please send me your free book,
"The American Wonderland."

Name ____________________

Address ____________________



Hands up!

No bandit cares about YOU personally.

What he wants is *your money.*

Smile—and let him take it. Only make sure *beforehand* that the joke is on him—as the joke assuredly will be *if* you carry

American Express Travelers Cheques

These cheques insure your traveling funds against theft or loss. These cheques can be used only when twice signed by *you*—once when you purchase them, and again when you spend them to pay transportation, hotel or other bills.

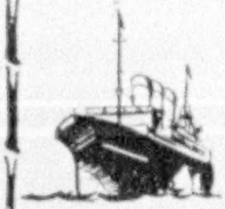
In addition to this money protection, carriers of American Express Travelers Cheques have the full and most efficient Service of 26,700 Express Offices in the United States and Canada, during the entire business day. This is a very personal and helpful Service in hundreds of ways—for business or pleasure—an exclusive feature of these cheques.

To vacationists—motoring, tramping, touring, traveling by train or boat, on the Pullman, shopping, or just resting at resorts—wherever the security of traveling funds plus most helpful Service are desirable—American Express Travelers Cheques *are a necessity.* They are *spendable everywhere,* acceptable anywhere.

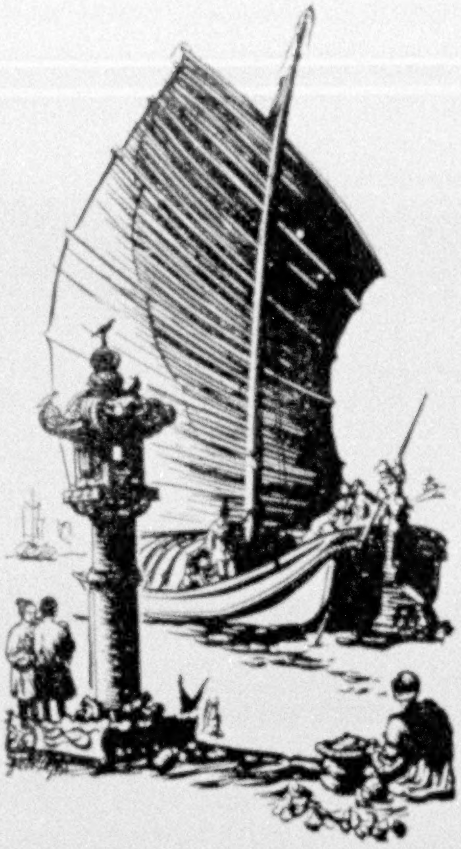
Issued in amounts of $10, $20, $50 and $100, American Express Travelers Cheques *cost only 75c for $100.*

FOR SALE AT 22,000 BANKS
AND EXPRESS OFFICES

American Express Co.
65 Broadway, New York



READ beforehand of days in Japan, of nights in China, of suns and moons that merge in the colorful romance of splendid dreams.



TRAVEL IN the Orient

A DROWSY old Chinese sampan—creeping along the harbor—and the Canadian Pacific "Empress" Liner swiftly passing—it is the Old World meeting the New!

The traveler is spellbound as he absorbs the rich wonders of the unchanging East.

Travel in the Orient is as entrancing as a tale of the Arabian Nights. For fullest enjoyment, there is one best way to go.

Four splendid Empresses sail fortnightly—from Vancouver, surrounding the sightseer in this ancient world with every luxury of the new—express steamers, from 26,650 to 21,000 tons, upholding in luxurious service the Canadian Pacific standard, and there is no better.

The itinerary provides swiftest passage from Vancouver 10 days to Yokohama, and then Shanghai, Hongkong and Manila.

Canadian Pacific
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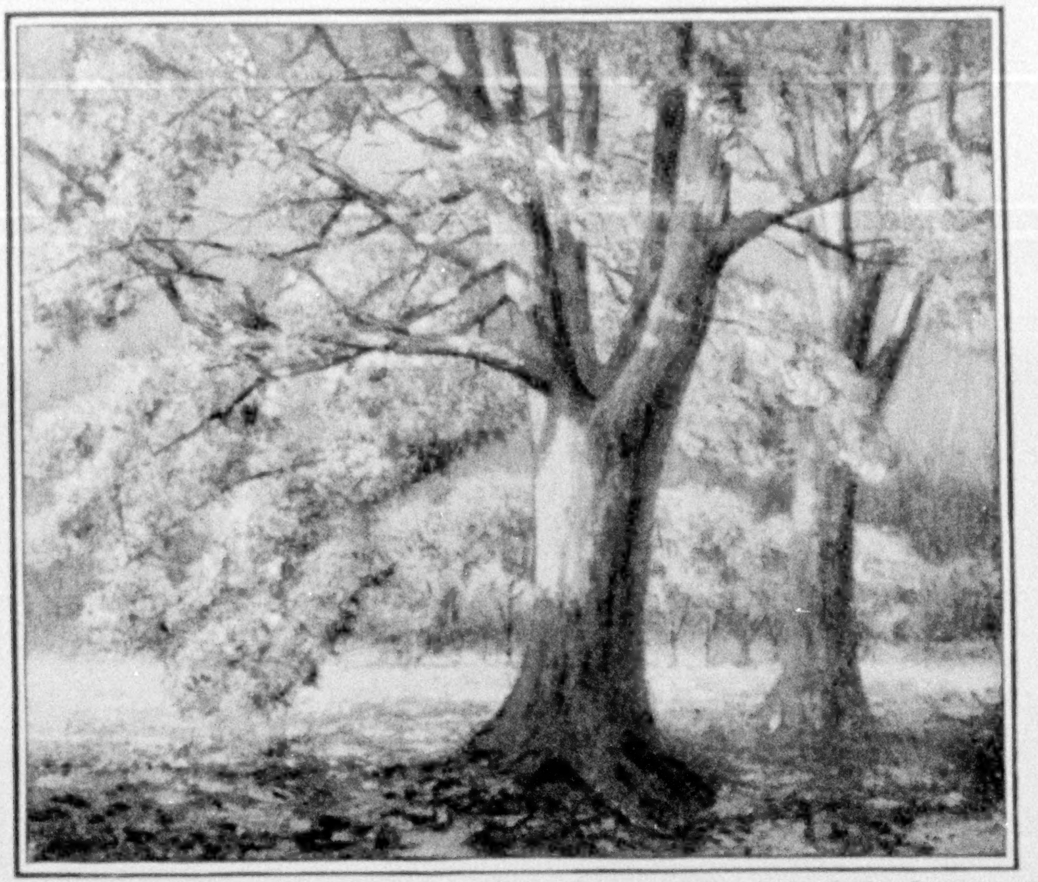
NEW YORK - - 344 Madison Avenue
CHICAGO - - - - Straus Building
SAN FRANCISCO - - 675 Market Street
MONTREAL - - 141 St. James Street

Canadian Pacific
Offices all over the world



Reproduction from a painting of the estate of Wm. H. Vanderbilt, Newport, R. I., by Sigurd Skou

© The D. T. E. Co., Inc., 1924

Your trees may be suffering from the unfavorable conditions of last year

THE long and excessively dry period of last summer did serious damage to many trees. Some of your trees may have dropped their leaves prematurely; on others the leaves may have turned brown and curled up. Some trees started to die back at the top; on many others the leaves turned to a sickly yellow—indicating a reduced vitality.

The heavy freezing in the late spring of 1923 killed many trees outright; on many others it sprung the bark and left open wounds to decay. In still other cases the tender growing tissues were injured and the growth stunted.

The tree is a living thing—it is just a big plant. Its food must be taken largely from the soil; it requires above everything abundant water. Anything which injures a tree sufficiently to reduce its vitality makes it much more susceptible to disease. Ill health in trees is just as dangerous as it is in every other form of life—it is very often a mere preliminary to death.

Davey Tree Surgeons are very much more than mechanical experts; they are trained in the science of tree life. Some trees are too far gone to be saved, but countless thousands of valuable trees can be saved by these master Tree Surgeons—if not neglected until it is too late.

Let Davey Tree Surgeons examine your trees carefully without cost or obligation on your part. Davey Tree Surgeons live and work regularly in your vicinity—any place between Boston and Kansas City, or in California. Write or wire nearest office.

Among prominent persons and institutions served by Davey Tree Surgeons are the following:

JAMES OLIVER CURWOOD
FRED STONE
PHILLIPS EXETER ACADEMY
FRESH MEADOW COUNTRY CLUB
YELLOW TAXICAB COMPANY
J. W. PACKARD
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HON. OSCAR W. UNDERWOOD
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AMBASSADOR GEORGE HARVEY

JOHN DAVEY
Father of Tree Surgery

Reg. U. S. Pat. Off.

THE DAVEY TREE EXPERT CO., Inc., 106 City Bank Bldg., Kent, Ohio

Branch offices with telephone connections: New York, Astor Trust Bldg., Fifth Ave. and 42nd St.; Boston, Massachusetts Trust Bldg.; Philadelphia, Land Title Bldg.; Baltimore, American Bldg.; Pittsburgh, 331 Fourth Ave.; Buffalo, 110 Franklin St.; Cleveland, Hippodrome Bldg.; Detroit, General Motors Bldg.; Cincinnati, Mercantile Library Bldg.; Chicago, Westminster Bldg.; St. Louis, Arcade Bldg.; Kansas City, Scarritt Bldg.; San Francisco, Hobart Bldg.; Montreal, 252 Lagauchetiere, West.

DAVEY TREE SURGEONS

Every real Davey Tree Surgeon is in the employ of The Davey Tree Expert Co., Inc., and the public is cautioned against those falsely representing themselves. An agreement made with the Davey Company and not with an individual is certain evidence of genuineness. Protect yourself from impostors. If anyone solicits the care of your trees who is not directly in our employ, and claims to be a Davey man, write headquarters for his record. Save yourself from loss and your trees from harm

HAWAII

COOL
This Summer

Take a few hundred dollars to your nearest railway, steamship or travel agent and tell him to book you from your home town to Honolulu—you're going to see for yourself *this summer* whether the songs, stories and pictures about Hawaii are true.

$300 or $400 pays for the round trip direct from San Francisco, Los Angeles, Seattle, Vancouver, B. C., or Victoria, B. C. That also permits you to "hit the high spots" on the principal islands, spending two or three weeks there. At least one big liner casts off every week for the 5 to 8 days' calm voyage.

A cool spot in the Pacific

Pack some medium-weight wraps in your luggage—you may need them. Mercury in Hawaii can't seem to climb above 88°—hasn't, anyway for 30 years.

As an American you'll need no passport. You will still be in the United States—hear your own language, sleep on good clean beds and read the world's news via Associated Press in island papers while eating your breakfast papaya or dinner avocado.

Phone for a laundress and she'll arrive in a flivver—but she'll leave her sandals at the door. Golf, and you may tee off into a rainbow. Play tennis, motor, hike, fish from a sampan, ride the surf at Waikiki. Gaze on Volcano Kilauea's everlasting fires in Hawaii National Park.

Why wait? The native diving boys pictured here, the brown-hued lei girls and the Royal Hawaiian Band will be at the Honolulu pier to bid you an exotic, unforgettable Aloha—meaning Welcome! Now, if you're still in doubt, ask anyone who has ever visited Hawaii.

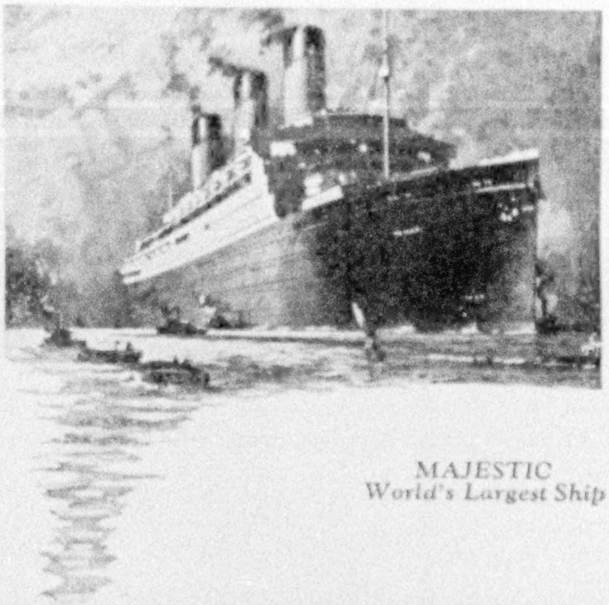
HAWAII TOURIST BUREAU
594 Monadnock Building, San Francisco, or
874 Fort Street, Honolulu, Hawaii, U. S. A.

Send me your new free illustrated booklet on HAWAII; also latest issue of Tourfax, containing data on special trips, hotel rates, etc.

NAME

STREET

CITY STATE



MAJESTIC
World's Largest Ship

244 Sailings to Europe

To Every European Country—direct service or convenient connections

The *personal* comfort of every passenger is the objective toward which our lines have directed their activities for more than half a century.

And so, today, little niceties of service and special comfort-giving luxuries make for the happiness and ease that mark a crossing on any of our vessels.

The Great Luxury Ships

—*Majestic*, world's largest ship, and holder of the speed record to Continental Europe, the *Olympic*, *Homeric*, the new *Belgenland*, the new *Minnewaska* and *Minnetonka*, the famous *Lapland*, each has its own way of welcoming the traveler and being a real home.

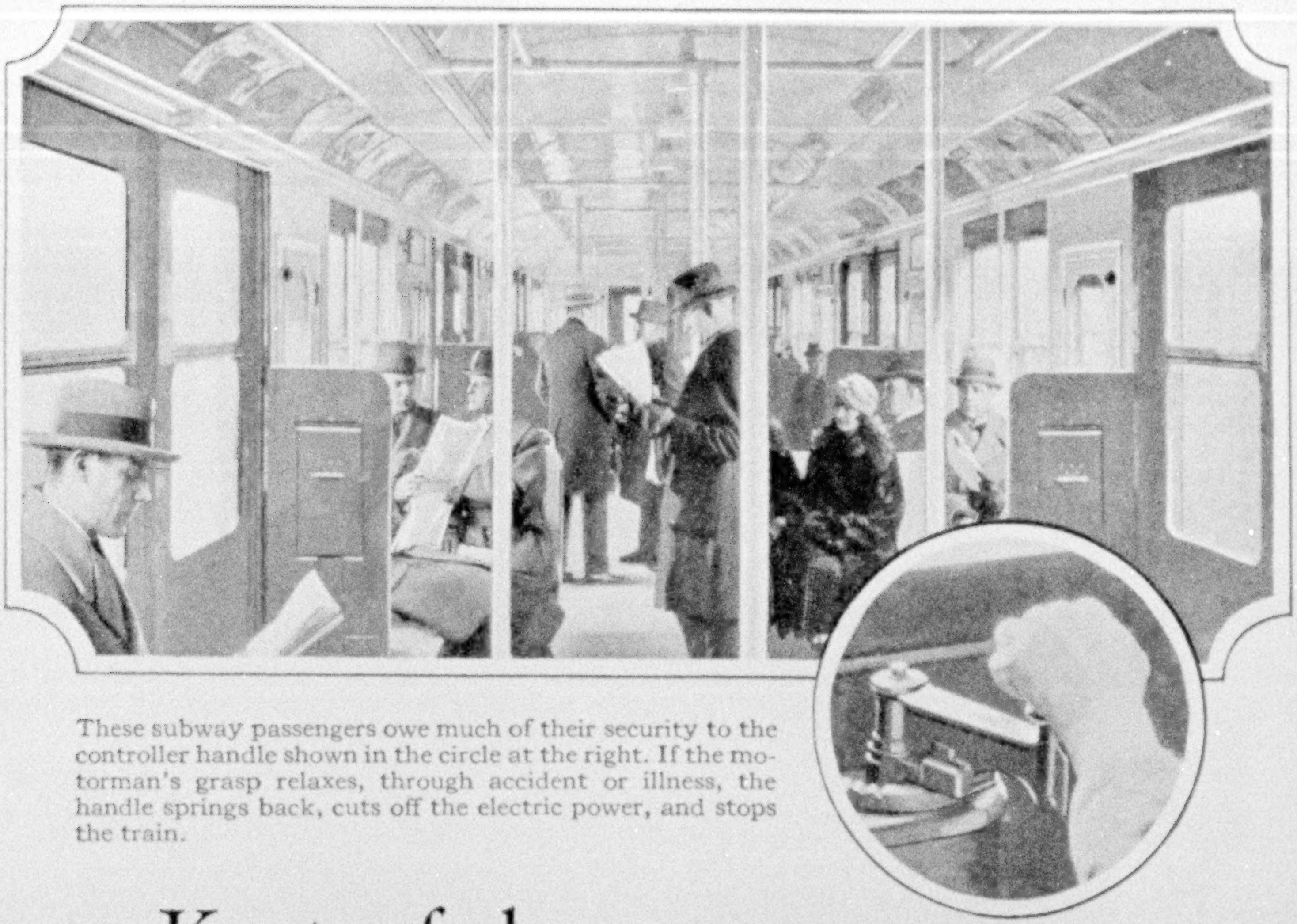
The "Big Four"—*Adriatic, Baltic, Cedric, Celtic*—offer weekly sailings to Ireland and to Liverpool, gateway to the tourist's England.

Facts About Our Fleets

112 ships.
1,200,000 tons.
Direct to Queenstown (Cobh), Liverpool, Plymouth, Southampton, London, Cherbourg, Antwerp, Hamburg, Naples and Genoa.
Sailings from New York, Boston, Montreal and Philadelphia.
Departures on Tuesday, Thursday and Saturday.
11 Cabin steamers—some with minimum rates of $115.
Second cabin accommodations on our fast liners offer all the solid comforts of ocean travel—Rates start at $125.
Offices in principal cities; and agents everywhere at your service.

For further information or descriptive booklets apply to No. 1 Broadway, New York City, the company's offices elsewhere or any authorized steamship agent.

WHITE STAR LINE
AMERICAN LINE RED STAR LINE
INTERNATIONAL MERCANTILE MARINE COMPANY



These subway passengers owe much of their security to the controller handle shown in the circle at the right. If the motorman's grasp relaxes, through accident or illness, the handle springs back, cuts off the electric power, and stops the train.

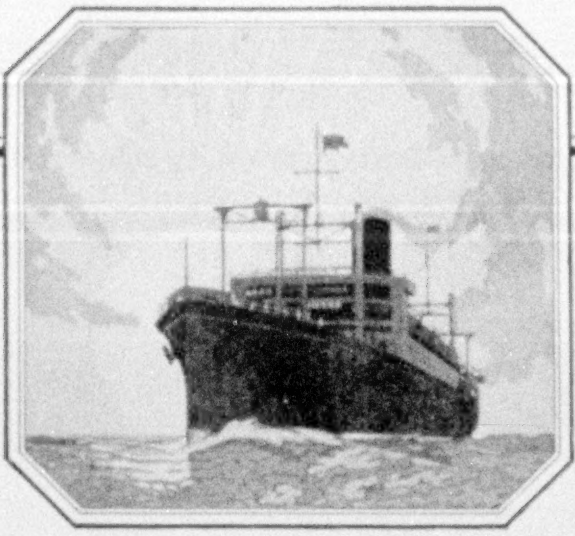
Kept safe by the "dead man's handle"

This safety device helps to make our city subways and elevated lines the safest railroads in the world. It is one of many contributions to security developed by General Electric engineers.

Since its formation in 1892, General Electric Company has been responsible for many inventions, each marking a forward step in electrical progress.

General Electric engineers are at the service of every manufacturer who seeks larger production with lower costs, and *safety first*.

GENERAL ELECTRIC



Going to the ORIENT?

Investigate American Ships First

IF you feel the call of the Far East, send the information blank below today. Make your plans now to go this summer and be sure to investigate American ships first. Round trip rates are: $600 and up to Japan, $692 and up to Shanghai, $750 and up to Manila or Hong Kong.

Send the coupon below today for illustrated literature. Find out about the great U. S. Government ships operated by the Admiral Oriental Line over the "Short Route" from Seattle, and by the Pacific Mail Steamship Company over the "Sunshine Belt" from San Francisco via Honolulu. Ports of call: Yokohama, Kobe, Shanghai, Hong Kong and Manila.

Admiral Oriental Line

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112 West Adams Street, Chicago, Ill.
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Pacific Mail S. S. Co.

508 California Street, San Francisco, Cal.
503 South Spring St., Los Angeles, Cal.
10 Hanover Square, New York City

Consult your local agent

Managing Operators for

U. S. SHIPPING BOARD

INFORMATION BLANK
To U. S. Shipping Board
Infor. Bureau 1555 Washington, D. C.

Please send without obligation the U. S. Government Booklet giving travel facts. I am considering a trip to the Orient.

From Seattle ☐.
From San Francisco ☐.

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Rock Island

Colorado
Yellowstone
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There's double enjoyment in a Rock Island vacation trip to Colorado, Yellowstone or California. You can go one way and return another. Superior service. Very low summer fares. Stop-over anywhere, too.

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Rock Island Lines
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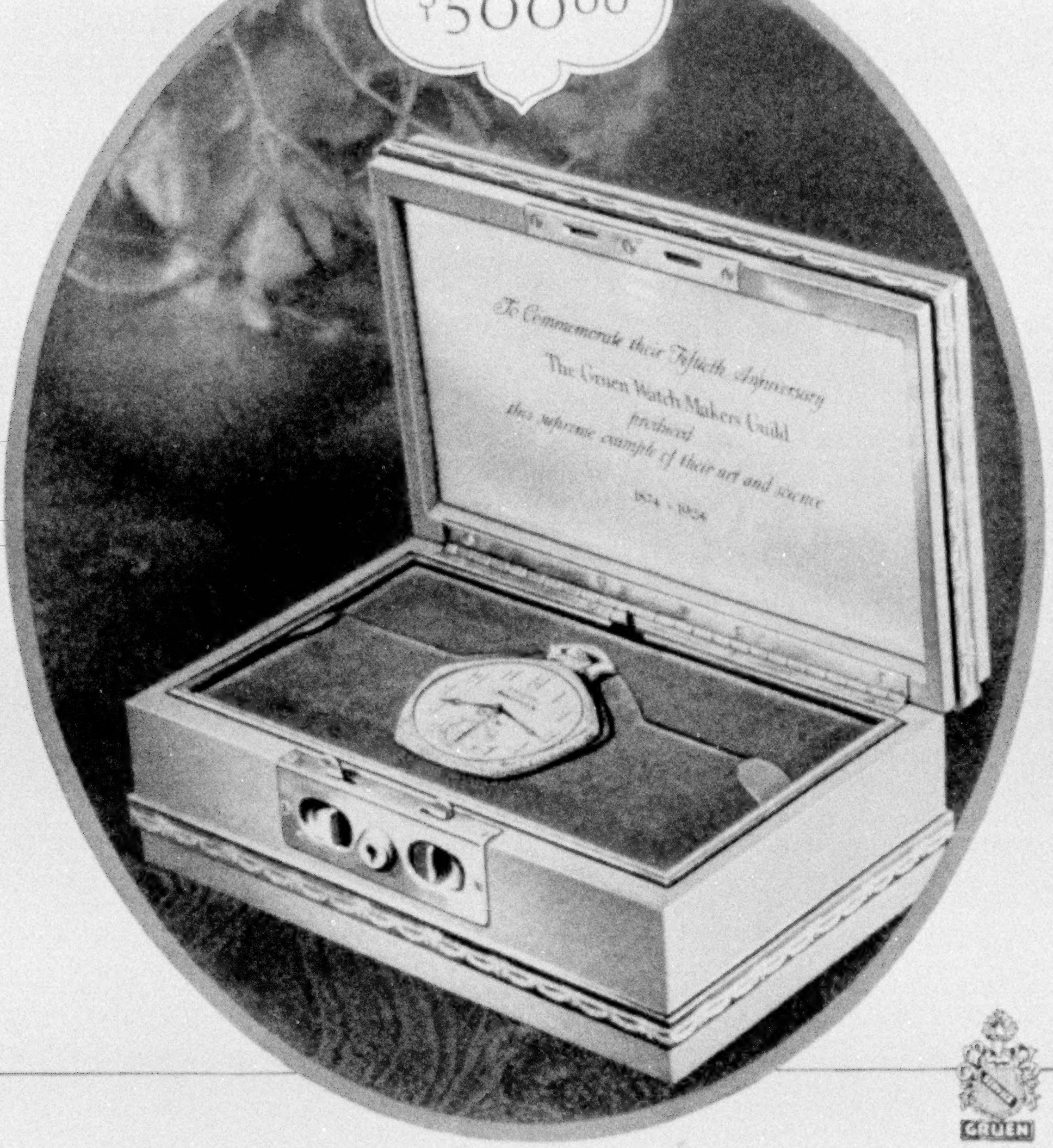
Rock Island Lines

GRUEN

1874 — 1924

Fiftieth Anniversary Watch

$500.00


To Commemorate their Fiftieth Anniversary
The Gruen Watch Makers Guild
produced
this supreme example of their art and science
1874 - 1924

GRUEN

WE PRESENT this watch as the supreme example of our art and science, to commemorate our Fiftieth Anniversary, and to place, as it were, the cap stone on our half century of watchmaking achievement.

It was planned and produced under the personal direction of our President, himself an expert horologist.

We believe it achieves the high ideal he sets for it—to be the finest, most costly watch movement ever made, and the last word in horological instruments of Precision.

We know it carries with it all the pride of craft we possess. The movement is made of solid gold throughout, engraved in the old guild manner, and jeweled with diamonds and rubies.

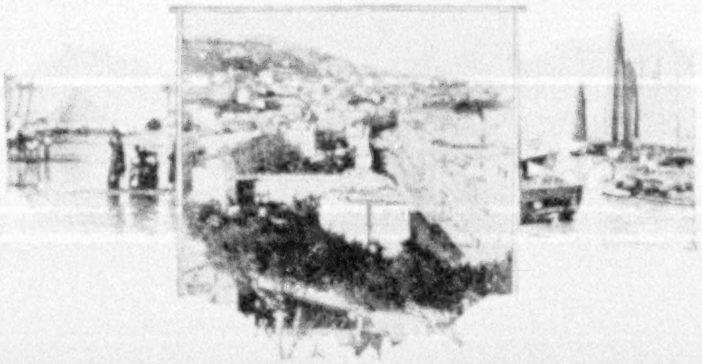
The case is of solid green or white gold in the Gruen Pentagon or other designs. If desired, the movement may be had, at an additional cost, in a platinum case or with diamond decoration.

The presentation box is an exquisite bit of workmanship, a complete jewelry chest.

Only a *very* limited number of these watches have been made and no more will ever be produced. Mr. Gruen desires these to go solely into appreciative hands, and they will only be shown by appointment and reservation.

FRED G. GRUEN, PRESIDENT, GRUEN WATCH MAKERS GUILD, Time Hill, Cincinnati, Ohio

Engaged in the art of watch manufacturing since 1874



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to 21 World Ports

Uniform accommodations on Seven Sister Steamships—President Ships—Optional Stopovers—Regular fortnightly Schedules. The finest interport and Round the World Service now available to all travelers.

SEE the strange sights and rare beauties of the world. Go around the globe, or visit selected lands. Here is the new service with advantages never before offered to travelers.

Twenty-one world ports are reached by seven sister steamships, sailing on regular fortnightly schedules. See Havana and the Panama Canal in this luxurious way. Visit Hawaii with its unbelievably beautiful coloring and its Volcano Kilauea.

Go to Kobe, from which you may visit Osaka, Yokohama and Tokio.

Shanghai and Hong Kong open up China, giving you the queer contrast of modern business life with the ancient civilization of the Chinese.

Continue then, if you like, around the world, seeing the Philippines, Straits Settlements, India, Egypt, Italy, France.

At any port which particularly intrigues you, remain for two weeks or longer, knowing that every fortnight another great Dollar ship will arrive to carry you on your way in exactly the same comfort in which you started. They are speedy, dependable ships—have been commissioned by the U. S. Government to carry U. S. mail.

By remaining aboard the same ship, you may speedily complete the circuit of the globe—110 days. Thus you will see 21 world ports, having sufficient time at each to make short trips to the interior.

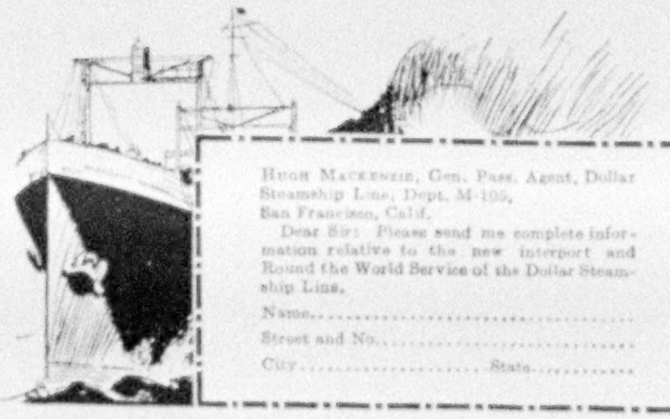
While you are in port (except for the week at New York) your ship is your hotel without extra cost. But the optional stopover privilege means leisurely travel in a way that no other service provides.

And, surprising as it may seem, the entire trip around the world on these palatial ships costs about the same as your ordinary home expenses.

Write now for complete information relative to this trip you have always wanted to take. Mail the coupon. Or call the Dollar Steamship Line office or any local ticket or tourist agent.

Plan now for this greatest of all trips which the new Dollar Line service makes available for the first time under ideal conditions.

DOLLAR
STEAMSHIP LINE



Hugh Mackenzie, Gen. Pass. Agent, Dollar Steamship Line, Dept. M-105,
San Francisco, Calif.

Dear Sir: Please send me complete information relative to the new interport and Round the World Service of the Dollar Steamship Line.

Name..

Street and No...................................

City.......................... State..............

See Oregon!

Gemmed with a thousand Beauty Spots

CRATER LAKE

SPEND your vacation where marvelous scenery and every outdoor sport may be enjoyed in the delightful summer climate of Oregon—in the Pacific Northwest—away from the intense heat. The days are bright and sunny, the nights cool and invigorating.

The Vacation of a Lifetime

Plan a real summer adventure where the picturesque Columbia River Highway is but one glorious link in the almost 2,000 miles of paved motor roads. In Oregon you can climb the snow peaks, fish for trout and salmon, camp, swim, explore, golf—where ideal resorts of mountain, beach, forest and lake afford excellent accommodations at reasonable rates.

Here, too, is a land of tremendous potential resources and unlimited possibilities of development in commerce, industry and agriculture to tempt your energies and capital.

The best and most direct motor route to Oregon, "Land of Opportunity" and other Pacific Coast resorts is via the Old Oregon Trail to Portland. By rail you have many choices and low summer excursion fares.

For information on Oregon's resorts and resources, address

Portland Chamber of Commerce
Bureau B, Portland, Oregon

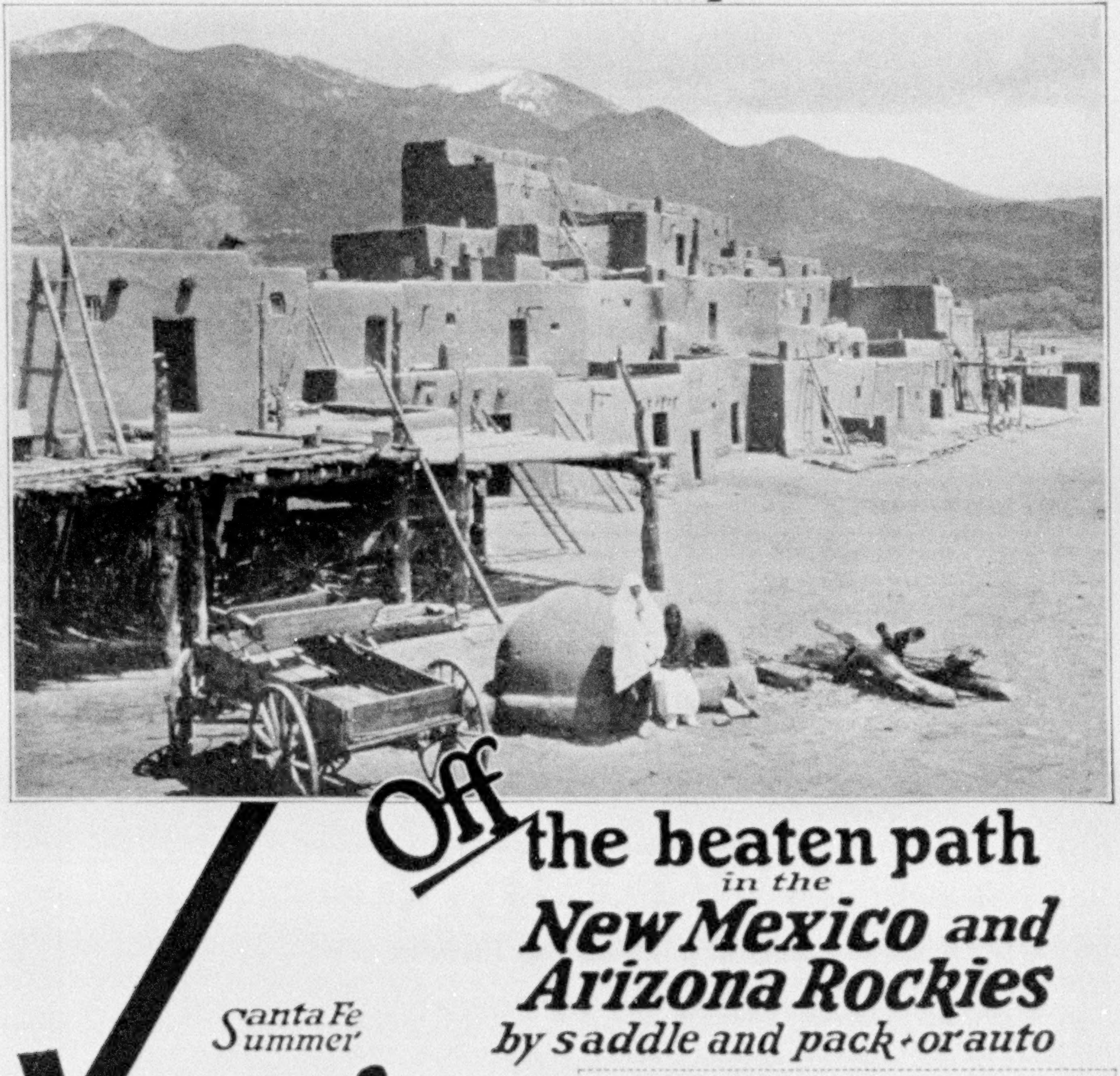
G3

COLUMBIA RIVER HIGHWAY near Portland

OREGON Invites You!

OREGON OFFERS OPPORTUNITY

Santa Fe



Off the beaten path

in the

New Mexico and Arizona Rockies

by saddle and pack • or auto

Santa Fe Summer

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W. J. BLACK, *Pass. Traf. Mgr. Santa Fe System Lines*
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Please send me picture-folders entitled "Off the Beaten Path," "Grand Canyon Outings," "Old Santa Fe" and "Mesa Verde National Park."

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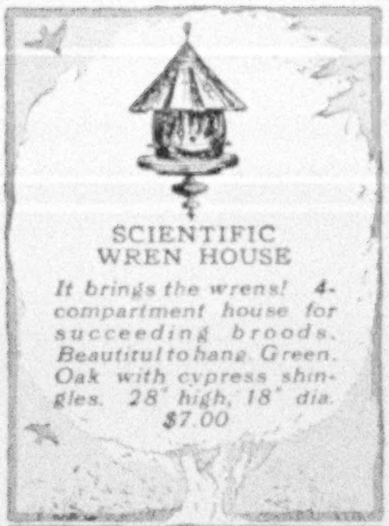

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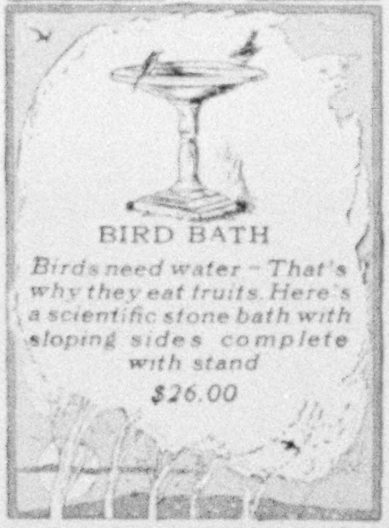

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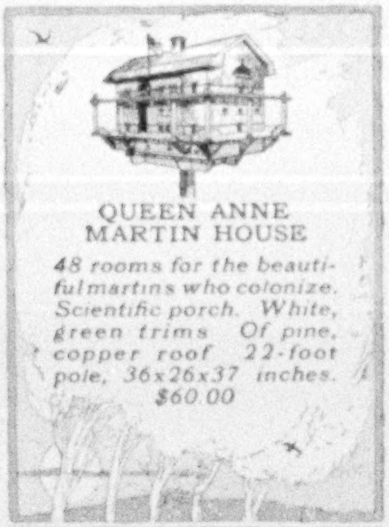

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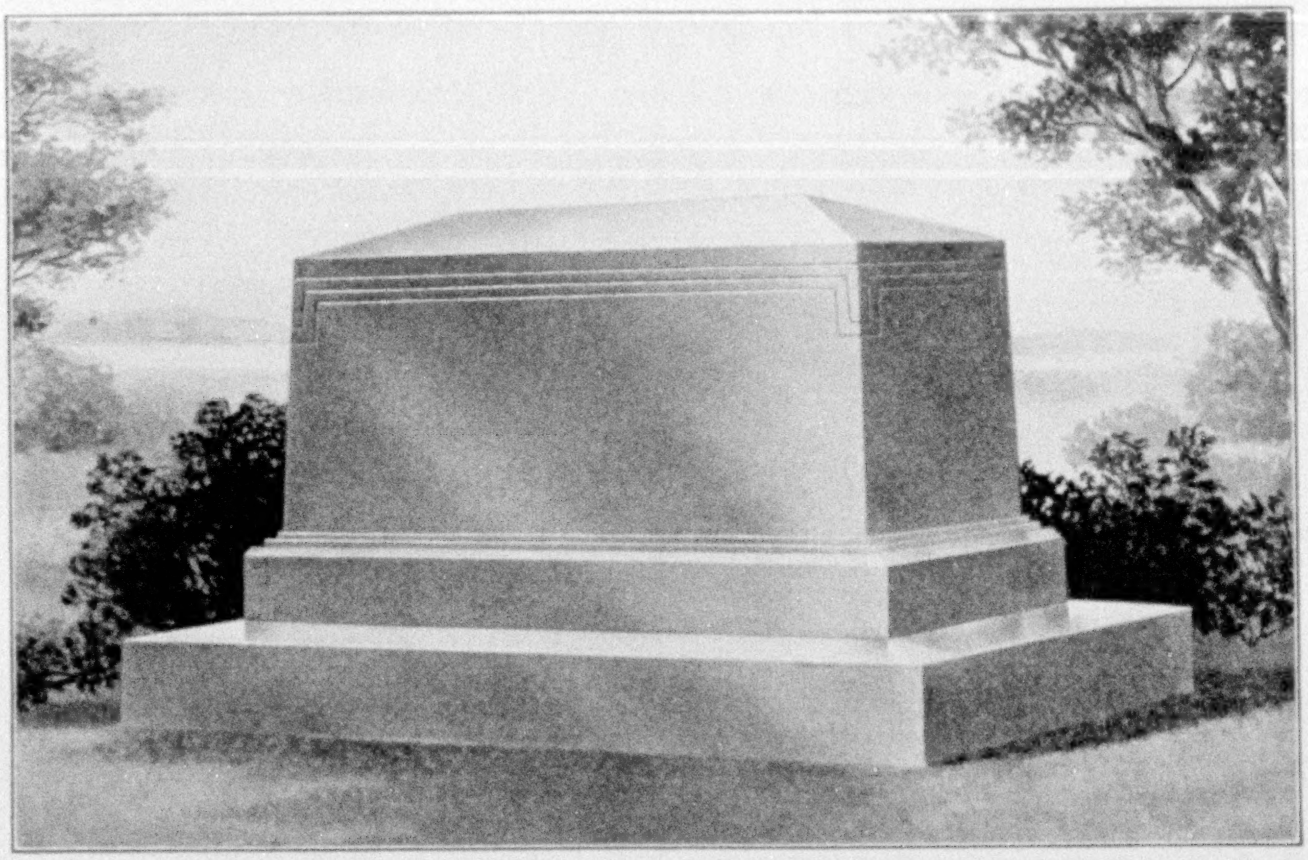

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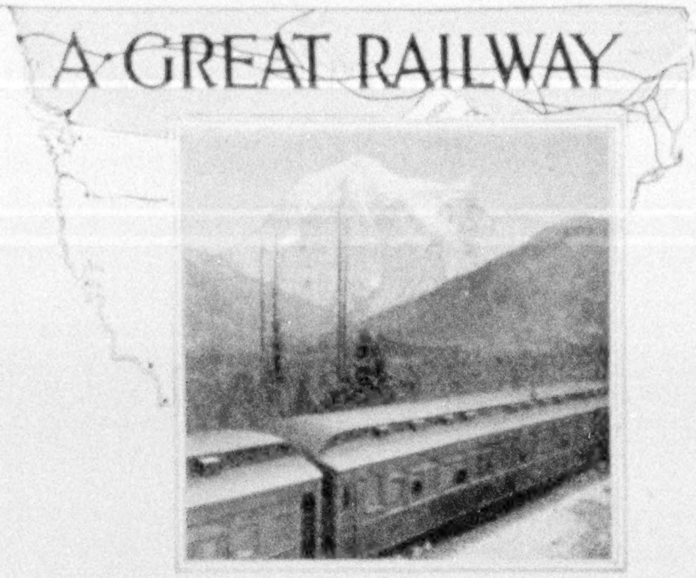

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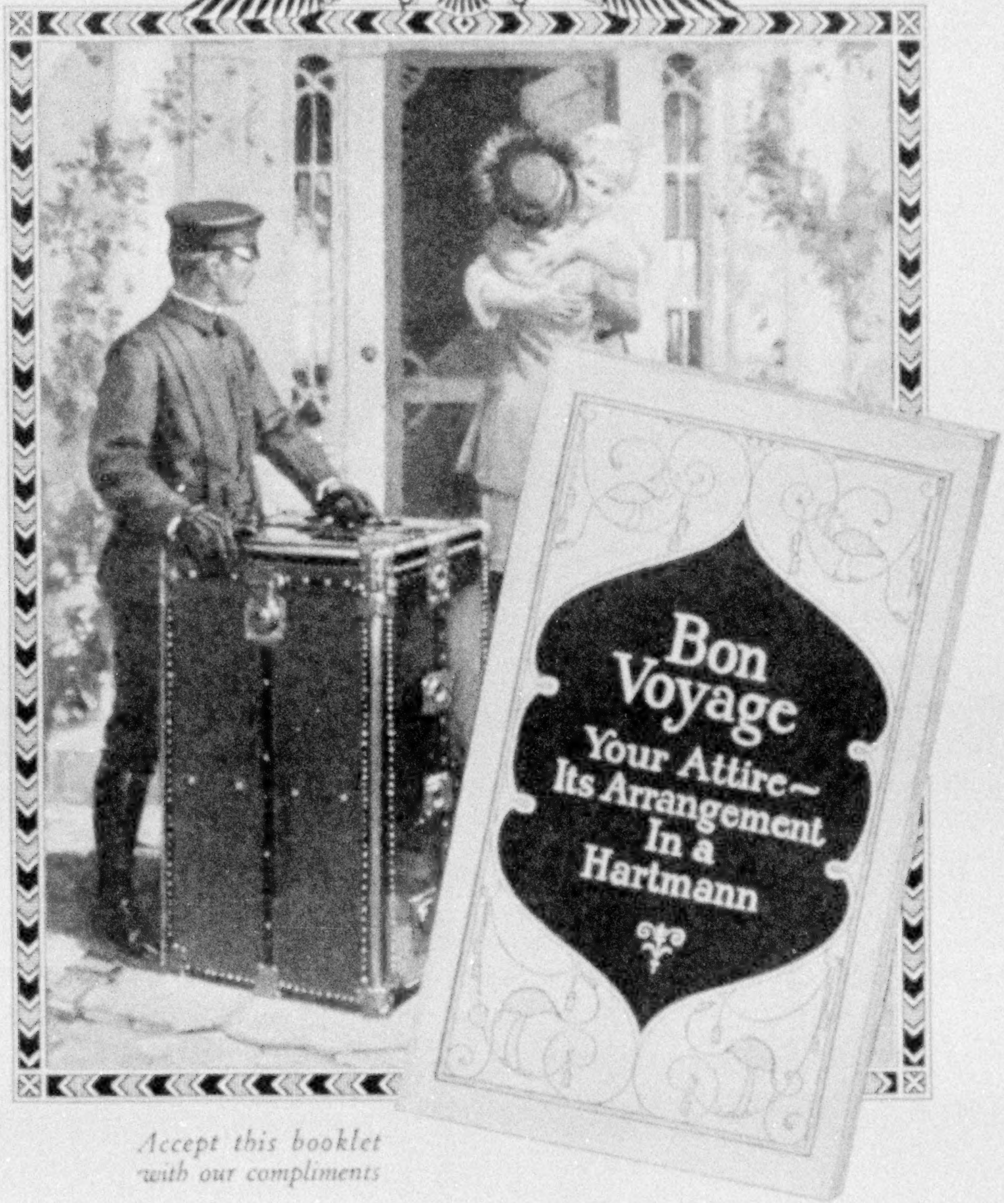

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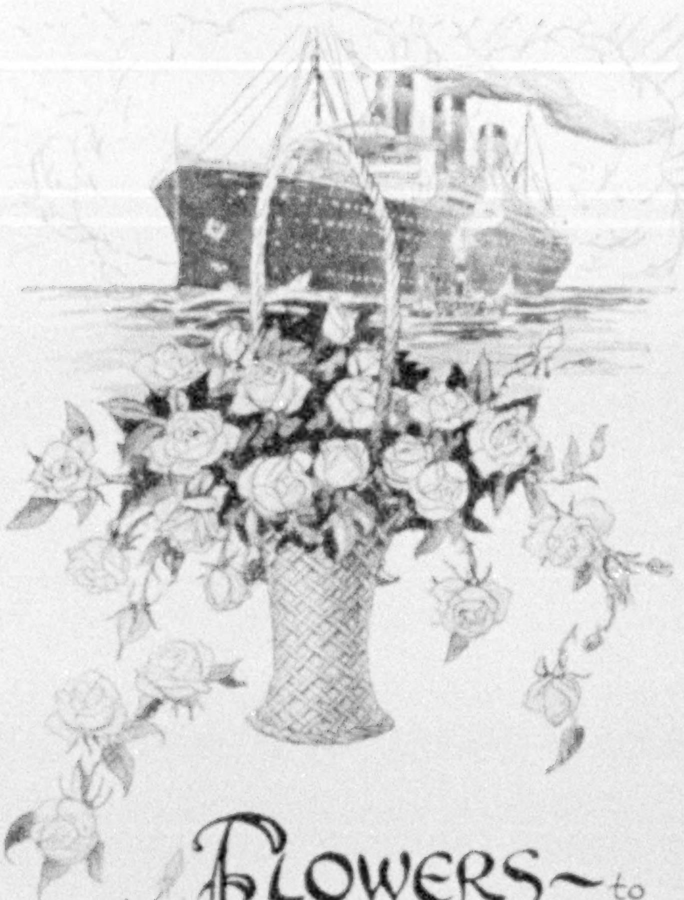

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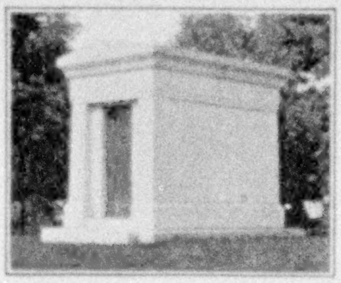

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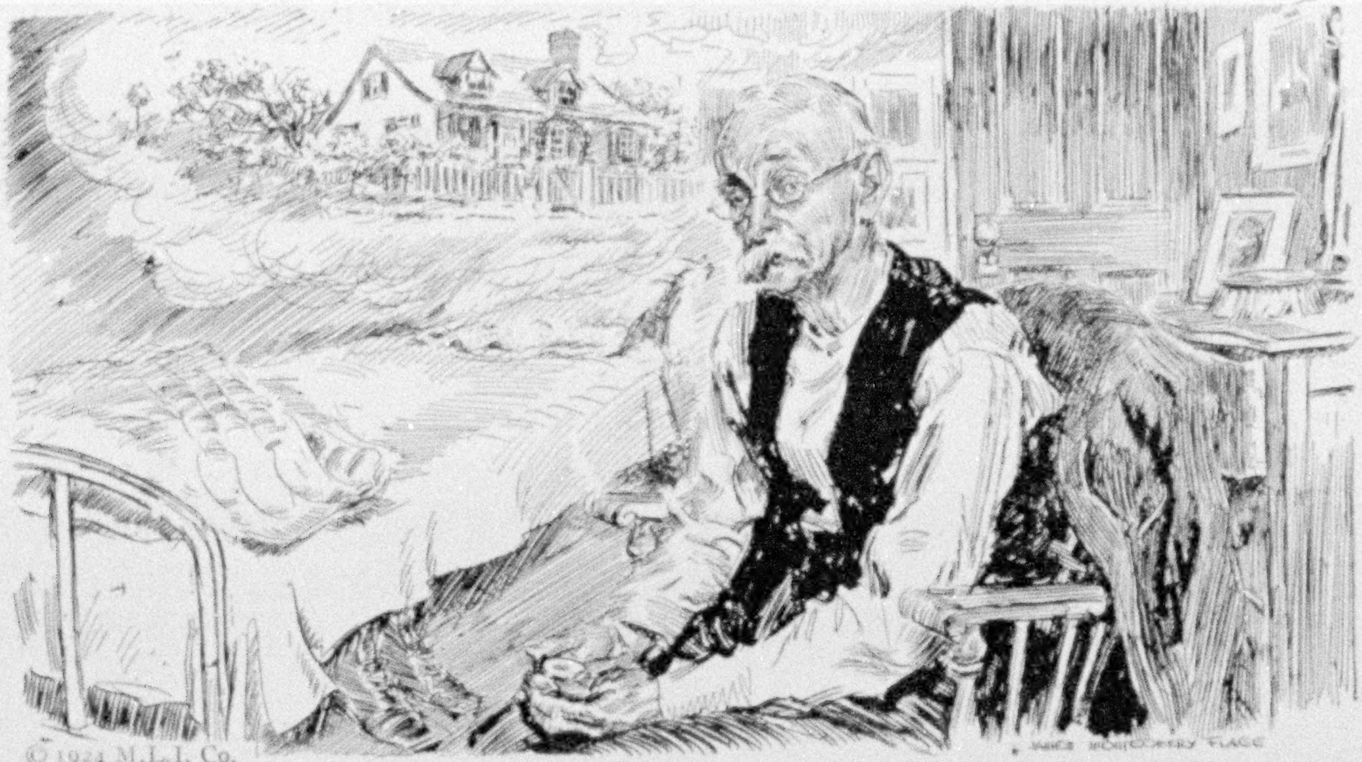

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HAVE you ever visited an Old Folks' Home? What a heart-breaking thing it is to see the pitiful attempts of these poor old people to give the few square feet of space they can call their own a touch of the real home they once knew. Not much can be done with only a cot, a bureau and a chair. Yet those who feel the home-hunger try pathetically to make the place seem like home by tacking up a few pictures torn from magazines and by keeping photographs on their bureaus.

And they call such places "homes"! The places where the poor, the sick, the deaf, the blind, the orphans and other public charges are housed. Shelters only—compared with real *homes* such as most of them formerly had.

More real homes and fewer "homes" are what this country needs right now. The welfare of the individual, the family, the nation, the whole world is based upon homes. Civilization itself is founded upon the home. Have you a *real* home or just a roof and four walls?

If you have a home—protect it. Make it permanent and *homelike*. Guard against the necessity of ever seeking shelter in a "home". Look at your home. Think about it. What can you do to make it better? Home surroundings exert such a tremendous influence over family life.

Better homes mean better children. Better children mean better men and women. Better men and women mean better citizens. And better citizens mean a better America.

THE LIGHT THAT NEVER FAILS

All over the country the movement for better homes is spreading. Corporations and civic bodies have given their aid; magazines and newspapers have given space to this great national movement which works toward better citizenship.

The Metropolitan Life Insurance Company is heartily in sympathy with these plans to relieve the housing shortage, and to provide happier living conditions. Since June 1920 it has made 24,508 loans on dwellings and apartments, aggregating $171,663,100, that provided accommodations for 49,850 families.

But outside of the Cities? In the same period—since June 1920—the Company made 16,383 loans on farms in twenty-two agricultural States.

To provide against the danger of loss of home by mortgage foreclosure, in case of death or disability of the home owner, the Metropolitan has devised a special form of home protection known as a Mortgage Redemption Policy.

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HALEY FISKE, *President.*

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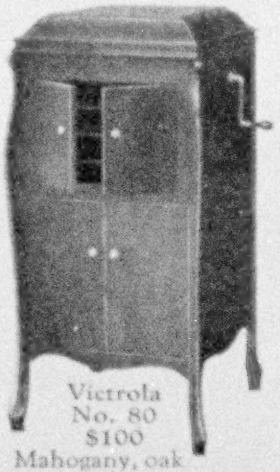
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Mahogany, oak or walnut

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The Elman tone is a thing of wonder among violinists as well as to the vast multitude who participate in music by hearing it. That this tone should be as conspicuous in his records as it is in his personal performance puts such records as these among the world's great works of art:

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Cavatina Souvenir de Moscow	6093	$2.00
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Vol. XLV, No. 5 WASHINGTON May, 1924

THE NATIONAL GEOGRAPHIC MAGAZINE

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SURVEYING THE GRAND CANYON OF THE COLORADO

An Account of the 1923 Boating Expedition of the United States Geological Survey

By Lewis R. Freeman

SEVEN of our United States are vitally interested in the great Colorado River which, with its major tributaries, has a length of more than 1,700 miles and the phenomenal fall of 10,000 feet between its head waters in the Rocky Mountains and its mouth in the Gulf of California.

The control of the flood waters of this mighty river and the utilization of the power which now goes to waste in its drop of nearly two vertical miles, as well as the vast irrigation projects which have been and are yet to be developed along its course, directly concern the citizens of Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, California, and our neighboring Republic of Mexico.

The most spectacular section of the Colorado River Basin is the Grand Canyon, with its mile-high, multihued walls, which in any list of natural wonders of the world inevitably stands among the first.

More than half a century ago John Wesley Powell made two daring and historic voyages through this Grand Canyon and later published some remarkably interesting narratives of his explorations.

Probably the work of no other explorer of the nineteenth century—not even that of Stanley and Livingstone in Africa—has survived a period of fifty years with so little modification from the observations of those who followed.

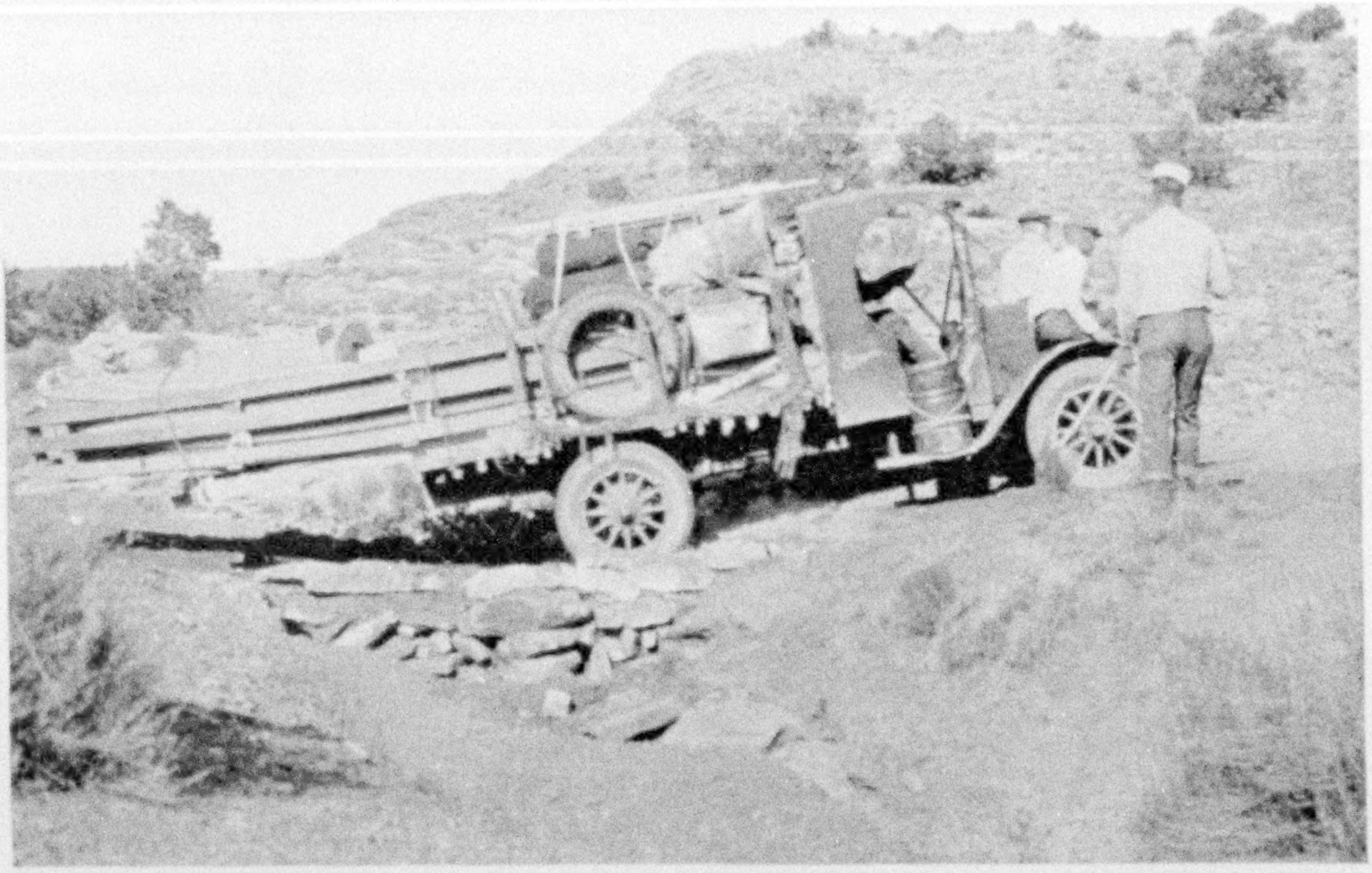
But with the vast projects for irrigation, flood control and power development which now engage the thoughts of empire-builders of our West, more specific information than that obtained in 1872 has become essential. Therefore, in the summer of 1923, the United States Geological Survey, a government bureau which in large measure owes its establishment to Powell, the pioneer explorer of the Colorado, organized an expedition to make a new map of the Grand Canyon—the last stretch of the great river which remained to be accurately surveyed.

PERSONNEL OF THE PARTY

Claude H. Birdseye, Chief Topographic Engineer of the Geological Survey, was named to organize and head the expedition. With the surveying of Mount Rainier and of the crater of Kilauea and other notable field work to his credit, he was especially well fitted for the arduous work.

The Geological Survey party assembled in Flagstaff, Arizona, on July 15. The leader, a topographic engineer, a hydraulic engineer, a geologist, a rodman, a cook, and one boatman for each of four boats comprised the party.

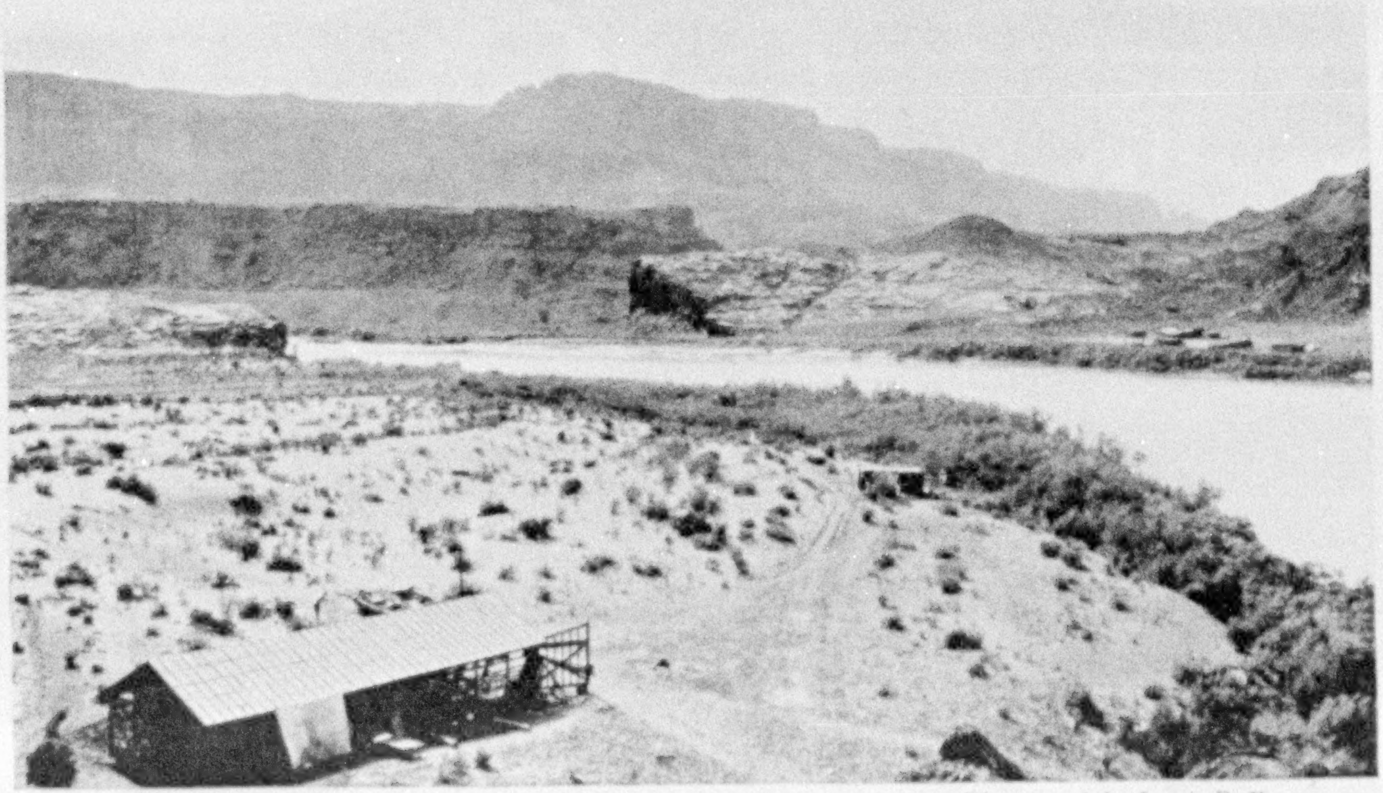
R. W. Burchard, the topographic engineer, had surveyed the Boulder Canyon dam site, as well as most of the river between the foot of the Grand Canyon and



Photograph by E. C. La Rue

ONE OF THE CANYON EXPEDITION BOATS BEING TRANSPORTED BY MOTOR TRUCK TO LEES FERRY

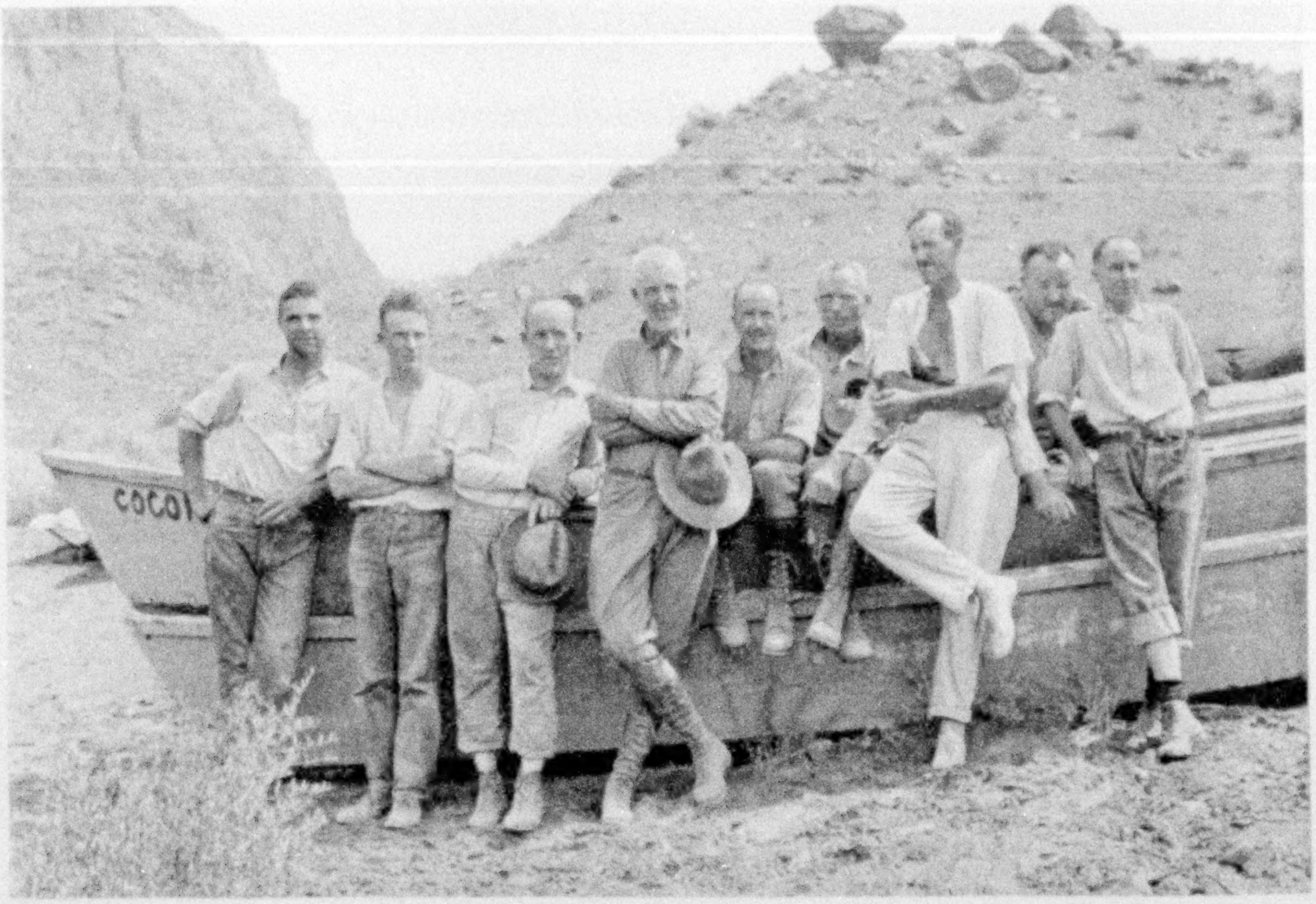
At some points on the road from Flagstaff, Arizona, it was necessary to rebuild the road (see text, page 473).



Photograph by Lewis R. Freeman

THE BOATHOUSE AT LEES FERRY, WITH VERMILION CLIFFS IN THE DISTANCE

Three of the boats to be used by the expedition were here when the party arrived (see text, page 473).



THE SURVEY PARTY AT LEES FERRY

Left to right: Leigh Lint, boatman; H. E. Blake, boatman; Frank Word, cook; C. H. Birdseye, leader of the expedition; R. C. Moore, geologist; R. W. Burchard, topographer; E. C. La Rue, hydraulic engineer; Lewis R. Freeman, boatman, and Emery C. Kolb, head boatman.

Needles; also 35 miles at the lower end of the Grand Canyon itself.

R. C. Moore, of the University of Kansas, geologist of the expedition, owed his appointment to the fact that he is an authority on the geology of the middle Colorado Canyon region, a former college athlete, and a veteran of many a hard summer's field work in the desert West.

The hydraulic engineer of the expedition was E. C. La Rue, of the Water Resources Branch of the Geological Survey, who qualified for that appointment through many years of specialization on Colorado River problems.

The boatmen of the expedition were H. E. Blake and Leigh Lint, two trappers and rivermen from the Northwest; Emery Kolb, the Grand Canyon photographer, and myself. Frank Dodge, the rodman, was also a competent boatman and by long odds the best swimmer in the expedition.

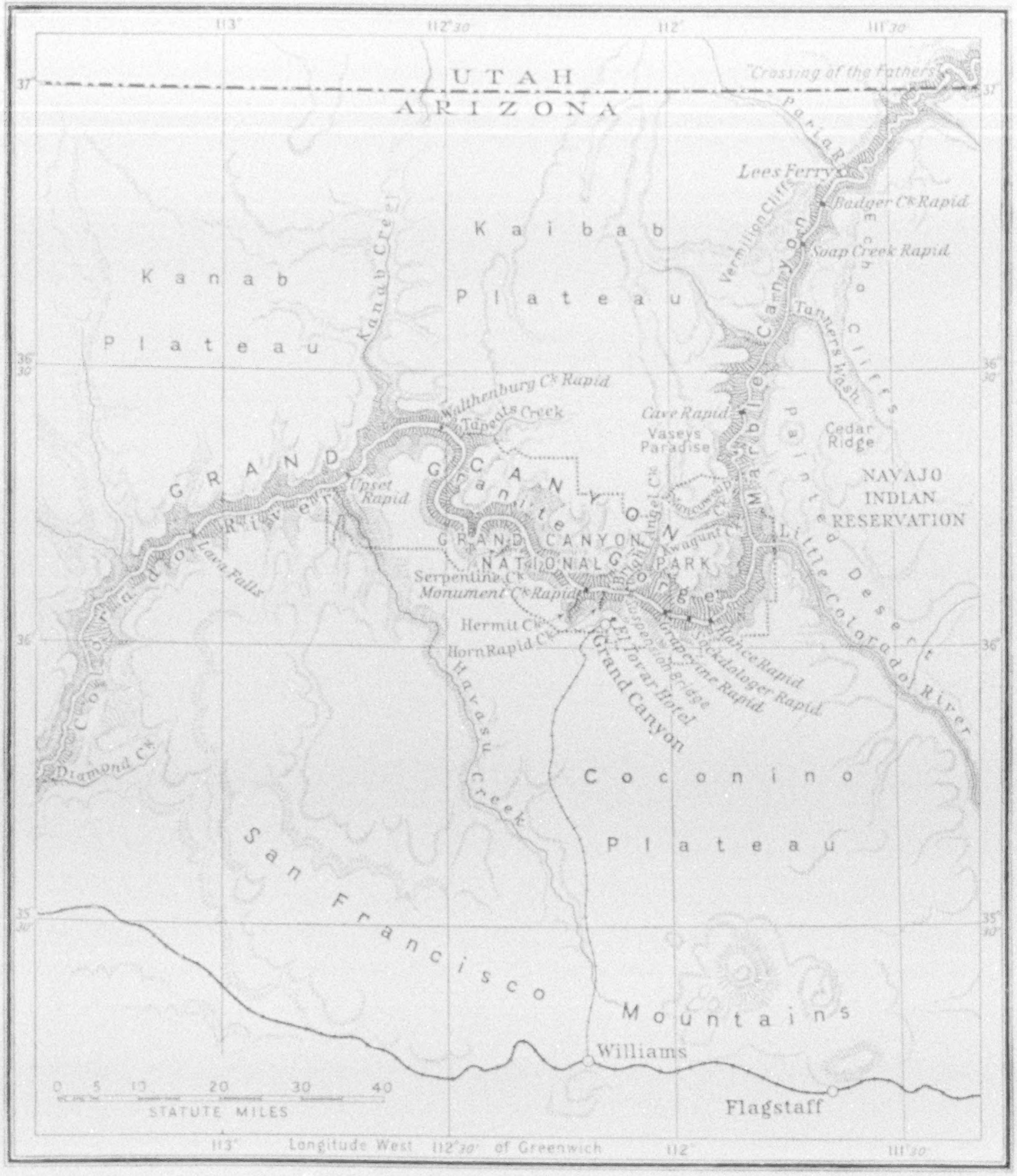
AT THE POINT OF EMBARKATION

Three of the boats to be used by the expedition were already at Lees Ferry; a fourth, built at Los Angeles Harbor, awaited us at Flagstaff. A cradle of heavy timbers was built on the truck to relieve the strain on the latter craft during a 140-mile run over ungraded mountain and desert roads to the river. With 10 feet of overhang behind the truck, men had to ride the radiator on the climbs to keep that vehicle from rearing like a balky horse (see page 472).

A second truck and two autos carried the remainder of the party and outfit.

Leaving Flagstaff at noon of the 18th, we camped that night at the Cedar Ridge trading post of the Navajo Indian Reservation. Pushing on early the following morning, we were delayed by the necessity of repairing washouts from a recent cloud-burst in the road along Tanners Wash. In spite of the tendency of the overhanging tail of the boat to wag the truck, little real trouble was encountered.

The gorge of Marble Canyon was as baffling as ever in its concealment, as we approached it across the plateau. It was impossible to say with certainty, judging


113°
112°30'
112°
111°30'
37°
UTAH
ARIZONA
"Crossing of the Fathers"
Paria R.
Lees Ferry
Badger Ck Rapid
Soap Creek Rapid
Vermilion Cliffs
Echo Cliffs
Tanners Wash
Kaibab Plateau
Kanab Plateau
Kanab Creek
Walthenburg Ck Rapid
Tapeats Creek
Cave Rapid
Vaseys Paradise
Cedar Ridge
Painted Desert
NAVAJO INDIAN RESERVATION
Marble Canyon
GRAND CANYON
Granite Gorge
Upset Rapid
Colorado River
Lava Falls
GRAND CANYON NATIONAL PARK
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Kwagunt Ck
Little Colorado River
Serpentine Ck
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Hermit Ck
Horn Rapid Ck
Havasu Creek
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Grand Canyon
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Sockdologer Rapid
Grapevine Rapid
Diamond Ck
36°30'
36°
35°30'
Coconino Plateau
San Francisco Mountains
Williams
Flagstaff
0 5 10 20 30 40
STATUTE MILES
Longitude West of Greenwich

Drawn by Charles E. Riddiford

A SKETCH MAP OF THE GRAND CANYON: THE 1923 EXPEDITION BEGAN ITS VOYAGE AT LEES FERRY

Twenty-one new dam sites were surveyed by the Grand Canyon party and the Diamond Creek dam site was resurveyed. The Geological Survey is now preparing a report which will give details of the possibilities for power development, flood control, and irrigation at each of these sites. The complete course of the Colorado River is shown on the Map of North America which is issued as a supplement with this number of THE GEOGRAPHIC

only from what met the eye, that even so much as an arroyo or gully intervened between the road and the wall of the Vermilion Cliffs towering against the northwestern sky. Yet the ever-deepening chasm of the world's most profound canyon was at times less than a mile distant from our winding desert track.

At the old Mormon dugway we were confronted with the alternative of unloading the boat and taking it down to the river by a long-unused stretch of grade or

Photograph by E. C. La Rue

THE "MARBLE" BEING SOAKED READY FOR THE TRIP THROUGH THE GRAND CANYON

This, one of the three boats loaned to the expedition, had been exposed to sun and dry air for two years. It had to be thoroughly reconditioned (see text, page 479).

trying to run it through on the truck. Fortunately, we decided upon the latter. Notwithstanding the fears of the driver that the boat was too long for the shelving curves, it rode through with plenty to spare.

Camp was made at the boathouse of the Southern California Edison Company, on the right bank of the river, just below the cable ferry. A temperature of 110° Fahrenheit in the shade, with considerable humidity, was trying, after the exhilarating mountain air of Flagstaff. As this was the sort of thing to be expected for the next month and a half, however, nothing was to be gained by waiting for a cooler spell.

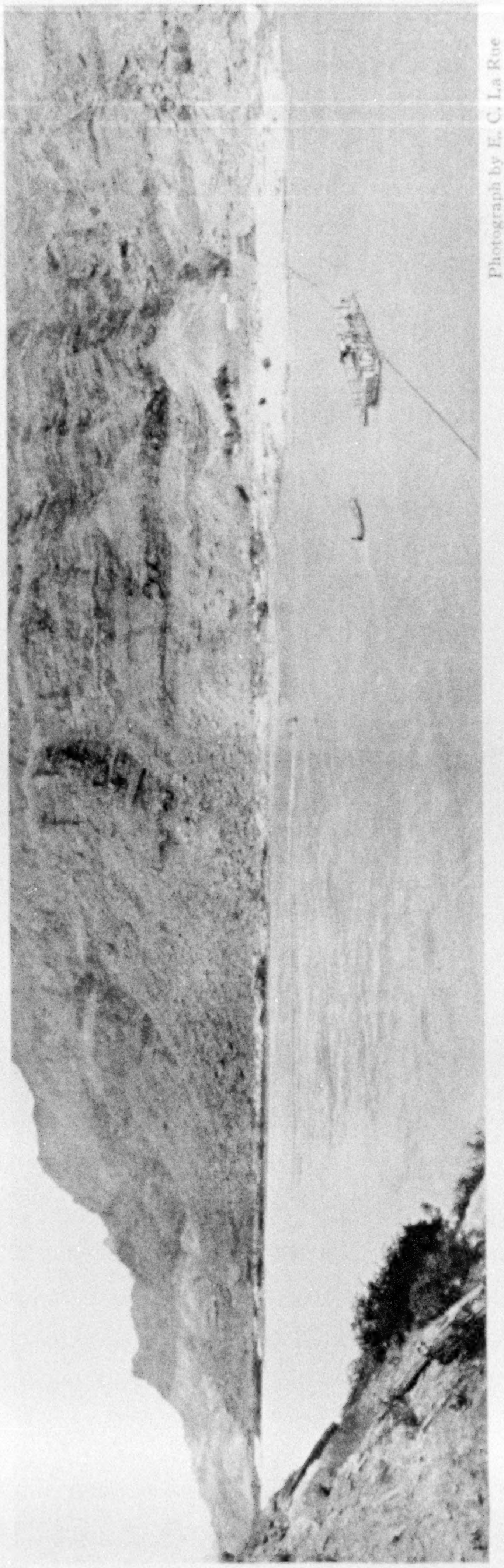
THE MOUTH OF THE PARIA HAS DRAMATIC HISTORY

The end-of-the-day plunge in the river that evening after work was over became an established feature for many weeks. The water was red with mud at its clearest; but it was a clean sort of mud, as mud goes, and came off freely under vigorous toweling. Until we were far enough down-river to be exposed to the liquid filth poured out by the floods of the Little Colorado, our evening, morning, and interim dips were refreshing.

The mouth of the Paria, from where our start was to be made, is one of the most historic points on the Colorado. Fray Escalante, searching for the ford which has since been called "The Crossing of the Fathers," camped there in 1776, seeking a way to reach the left bank of the Colorado. The "great gray cliff" where his party starved on horse meat and toasted cactus fruit is readily recognizable.

James Pattie, the trapper, passing here in the middle twenties, expressed his relief at coming out even temporarily from "the horrid mountains."

Powell, making an overnight camp at the Paria in early August of 1869, pushed off into the depths of Marble Canyon the following morning, on the final stage of his pioneer voyage. He met neither Indians nor whites in the valley at that time, but three years later his second expedition found the Mormon renegade, John



Photograph by E. C. La Rue

LEES FERRY FROM THE LEFT BANK

This point on the Colorado derives its name from a renegade Mormon who, after eluding officers of the law, cultivated a fertile patch of ground here. He was eventually captured, tried, and executed as the instigator of the Mountain Meadows Massacre. The voyage of the 1923 expedition from Lees Ferry to Needles, where the party disbanded, required 80 days.

D. Lee, farming a patch of fertile overflow land above the ford which still bears his name.

Lee was a fugitive from justice, being widely sought by the Federal authorities as the instigator of the Mountain Meadows Massacre of 1857, a crime for which he was finally tried, found guilty, and executed.

Dellenbaugh writes in delightful vein of the way in which he and one or two of the younger members of the second Powell party helped Sister Emma (Mrs. Lee XVIIIth) irrigate her melon patches, and how Jack Hillers got no end of a rise from the nervous fugitive by cocking a gun behind him during Lee's Sunday sermons.

The Brown-Stanton party, surveying for a railroad through the Grand Canyon, halted and refitted at Lees Ferry in July, 1889, after losing much of their inadequate outfit in the rapids of Cataract Canyon. Three of the eight men of the reduced party were lost within a few days of putting into Marble Canyon, forcing the temporary abandonment of the expedition.

Stanton's reorganized party had Christmas dinner at the Ferry six months later, before resuming the uncompleted survey. A few days afterward that indomitable leader was back again, this time to seek help to bring out his photographer, who had broken his leg by a 20-foot fall.

No place on the river has the power to awaken more memories of the past than Lees Ferry, but, strangely, little remains that can be touched save by the imagination. Lee's first log cabin and his four-way lookout on a point above the Paria are still there, but all we ever found that pointed to one of the early navigators was the name HISLOP, pricked in large capitals on the red sandstone of the house now occupied by the Government hydrographer. That could only have been the stout Scotch engineer, John Hislop, Stanton's right-hand man on both voyages. Hislop, after surviving the passage of the Grand Canyon rapids and several years in pioneering railroad work in Alaska, was finally killed by a street-car while home on a vacation.

EXPEDITION'S BOATS WERE FLAT-BOTTOMED AND DECKED OVER

The four boats used on our expedition, while differing slightly in size and details, were all of the flat-bottomed, decked-over, one-man type that is appropriately called the Galloway-Stone. The somewhat crude original was designed and built by Nathan Galloway, a Mormon hunter, for use on his lone-hand trapping expeditions to stretches of the upper Colorado canyons.

On the sound theory that it is better to avoid a rock in a light boat than to hit it with a heavy one, Galloway sacrificed strength for handiness, but built a boat which he repeatedly ran single-handed through rapids in which the large, heavy boats of Powell and Stanton had encountered much trouble.

When Julius F. Stone, an Ohio manufacturer, scientist, and sportsman, decided to make a voyage to photograph and study the geology of the Colorado River canyons in 1909, he had Galloway come to his home in Columbus, where the two men put their heads together to build an ideal boat along the lines of that already used with such success by the Utah trapper.

The present type of the Grand Canyon boat was the result. It was entirely decked over, except for a cockpit for a single oarsman, and weighed less than 250 pounds. Its length was 16 feet 4 inches, its beam 46 inches, and its depth 16 inches. The material was Michigan white pine five-eighths of an inch thick.

The four boats of this type built to Mr. Stone's order were used with signal success on his voyage through the canyons. The run from Green River, Wyoming, to Needles, California, was made in one week over two months.

Both Stone and Galloway brought their boats through all the way without an upset and with but a single little collision each while under control of the oars—by long odds the best record ever made, both for time and for skillful boatmanship.

THE KOLBS DOUBLED WEIGHT OF BOATS TO INCREASE STRENGTH

When the Kolb Brothers were planning their photographic expedition through the Colorado canyons in 1911, Mr. Stone furnished them with blue prints of the design of the boat which had served him so well. Desiring a boat of greater strength, the photographers retained the original dimensions, but doubled the weight by using heavier materials. Without greatly decreasing handiness, they materially increased power to withstand punishment. This boat weighed 500 pounds.*

Ten years later, when the Geological Survey and the Southern California Edison Company planned a joint expedition through Cataract Canyon, boats of larger dimensions were needed to carry the heavy outfits. Still retaining the lines of the Galloway-Stone original, 18-foot craft were built, with proportionate increase of depth and beam. These weighed close to 800 pounds and must have had not far from double the cargo capacity of the early prototype.

The fleet assembled for our Grand Canyon expedition consisted of three of these 18-foot boats and a lighter one of slightly different lines having a length of 16 feet.

One of the many interesting things that the coming voyage was expected to reveal was as to whether in the building of this comparatively heavy cargo- and passenger-carrying boat, there had been too great a departure from the original Galloway-Stone craft of extreme lightness and handiness. The latter weighed 243 pounds and was built to carry a comparatively light load and one man—its oarsman. The boats we were about to use were more than three times as heavy as this, carried at least twice the weight of cargo, and were expected to find places for three men; that is to say, there had been an increase of upward of 500 per

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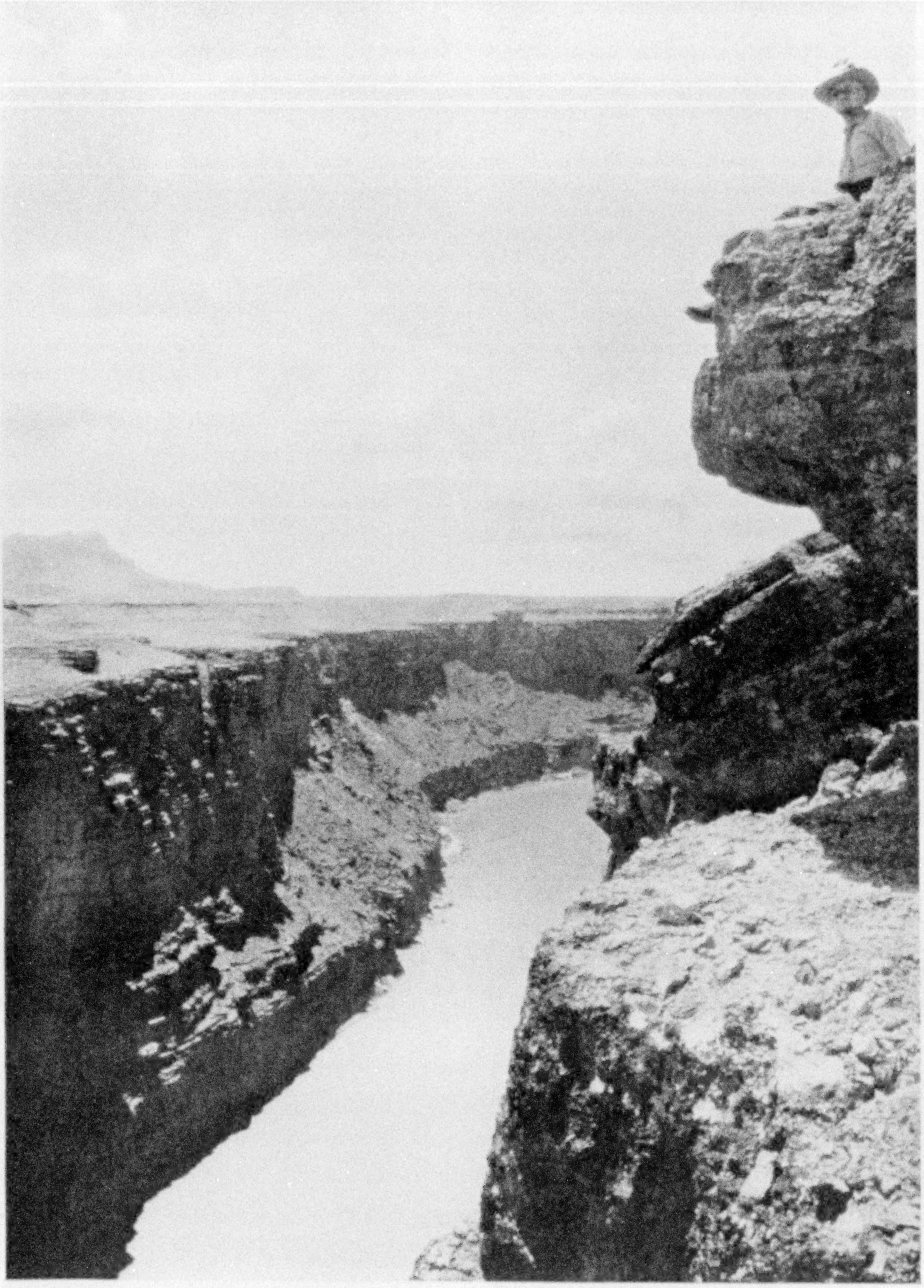
* See "Experiences in the Grand Canyon," by Ellsworth and Emery Kolb, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1914.



Photograph by Lewis R. Freeman

A PLACID STRETCH OF THE COLORADO RIVER NEAR THE HEAD OF MARBLE CANYON

"Ahead the portal of Marble Canyon was the beginning of a black gash cleaving the plateau like the wound from a giant's kriss" (see text, page 485).

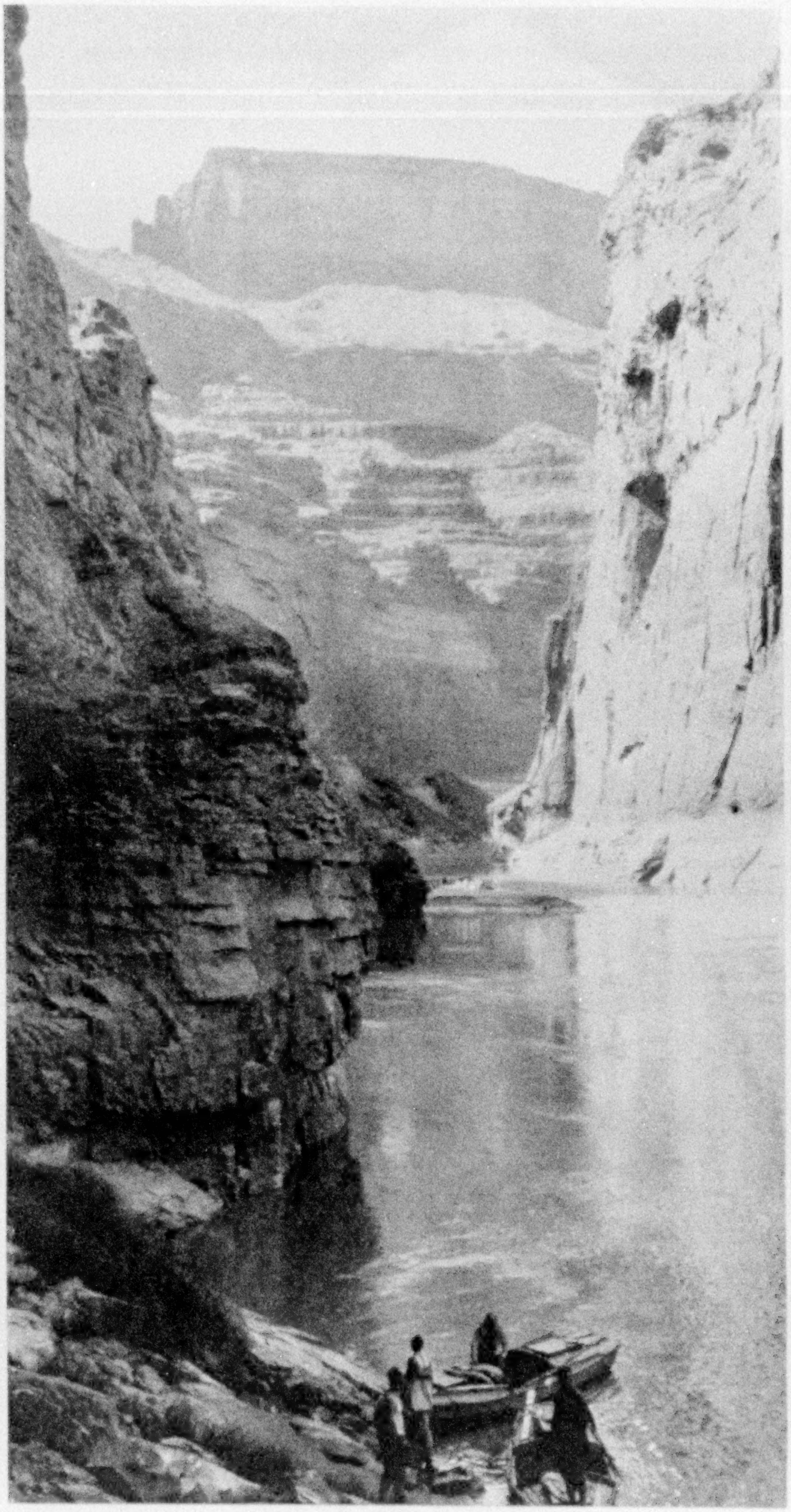
cent in weight without any increase of power.

The latest boat had still to be handled by a single man. Whether the demand was too great—whether too much handiness had been sacrificed for carrying capacity and strength — remained to be seen. The Powell and Stanton boats, it is true, were larger and heavier than these of ours, but they were manned by a minimum of three men each—two rowers and a steersman.

Thirteen days were spent at Lees Ferry getting ready for the voyage. Recoppered, recaulked, and repainted, the used boats appeared tight and thoroughly serviceable. A folding canvas boat, to be used by the rodman and to have below rapids, in the event of trouble, seemed to promise real usefulness—as long as it lasted.

Satisfactory waterproof bags and boxes had been made only after months of trials and experiments, during which all of the tubs and sinks and basins in the Geological Survey wing of the Department of Interior building in Washington had served their turns as testing tanks.

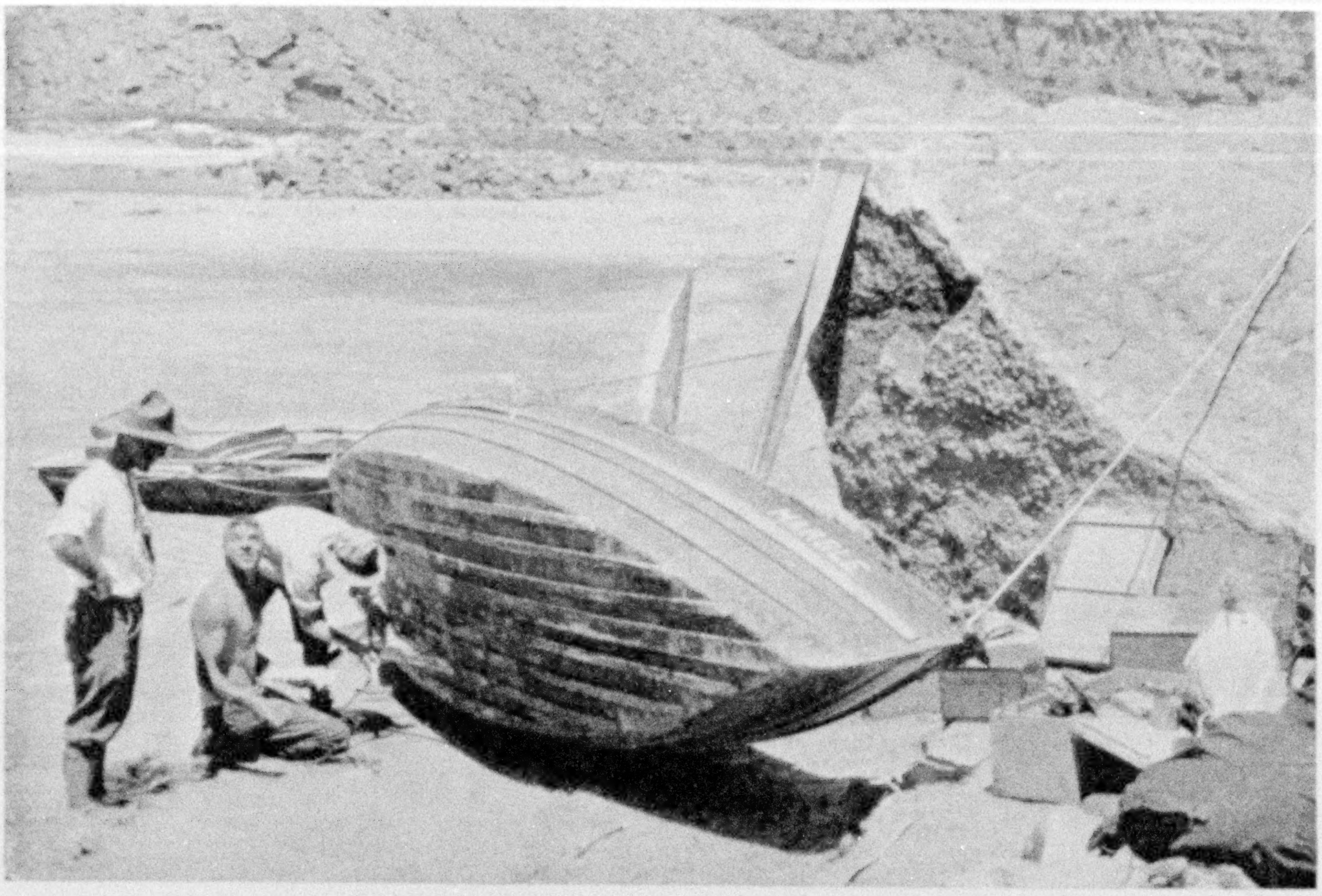
The best protection for bedding, duffel



Photograph by E. C. Kolb

SHEER WALLS IN MARBLE CANYON

The rate at which this canyon burrows its way into the earth never fails to astonish the traveler entering it for the first time. Twenty miles below its head, the walls are 2,000 feet above the river, nine-tenths being due to the rise of the plateau and one-tenth to the descent of the stream (see page 485).



Photograph by E. C. La Rue

THE "MARBLE" BEACHED FOR REPAIRS AFTER RUNNING BADGER CREEK RAPID

The bottom of the path-finding boat was punctured in the first rapid negotiated by the expedition, but the damage was quickly repaired (see text, pages 491 and 493).

and provisions such as flour, sugar and dried fruit, proved to be an inner sack of rubber, covered with an outer one of waterproofed canvas with a double tie.

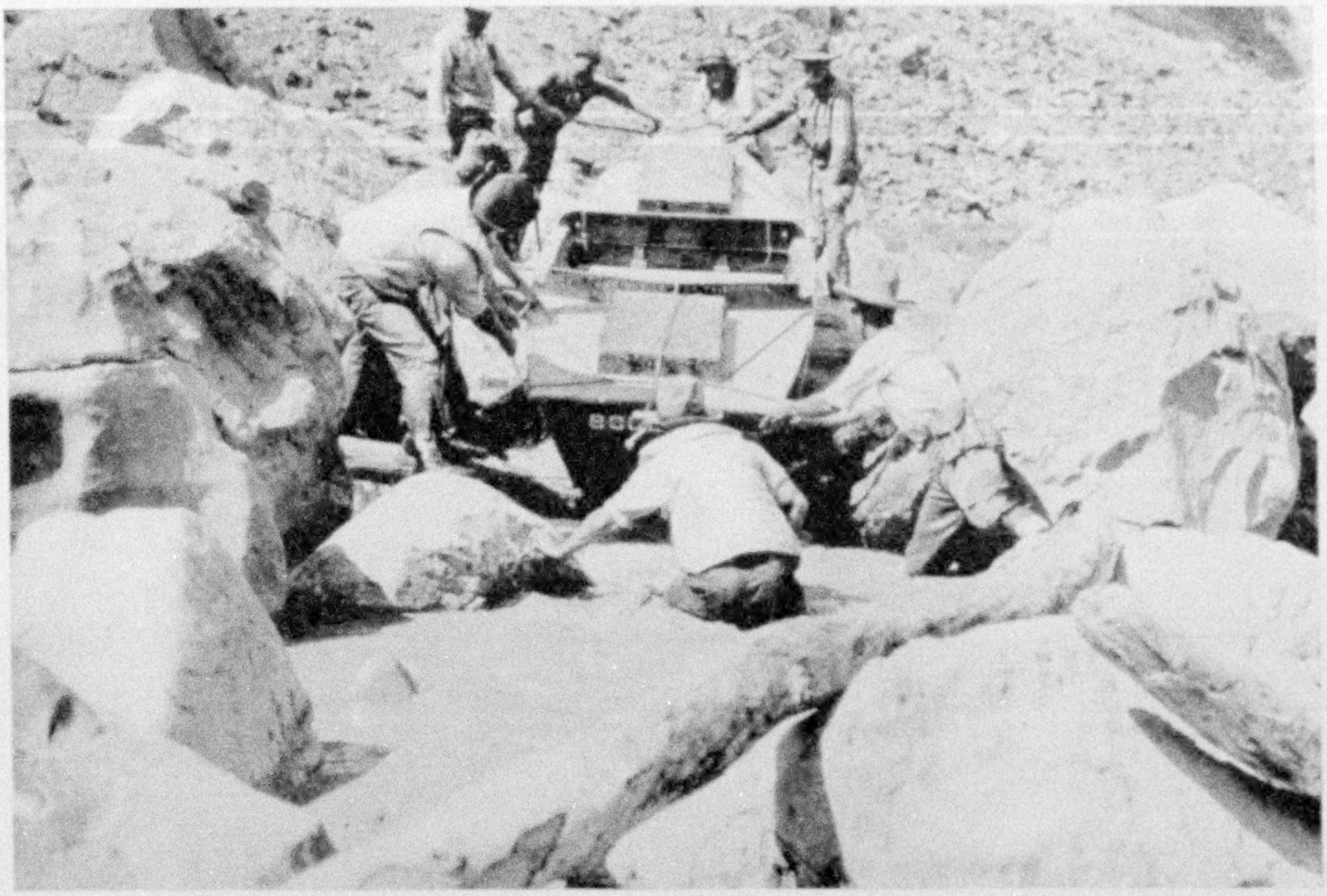
An attempt to make water-tight instrument and camera boxes from galvanized iron was a failure, principally owing to the tendency of the metal to bend under pressure. Further experimentation resulted in a highly serviceable wooden box, the cover of which was held down upon a rubber gasket by brass catches.

WE CARRY A RADIO SET AND SEVERAL TYPES OF LIFE PRESERVERS

Of the several kinds of life preservers provided, the old cork type was the only one giving any great amount of buoyancy. A type of stuffed jacket and an inflatable rubber girdle that just about kept a man up in quiet water were tried and the two worn in combination lifted him higher, but were scarcely less bulky than cork. Real freedom for rowing action in a life preserver was a problem which would have to be worked out by experience. Something of the kind had to be worn in every bad rapid; that was the leader's order and a very sensible one.

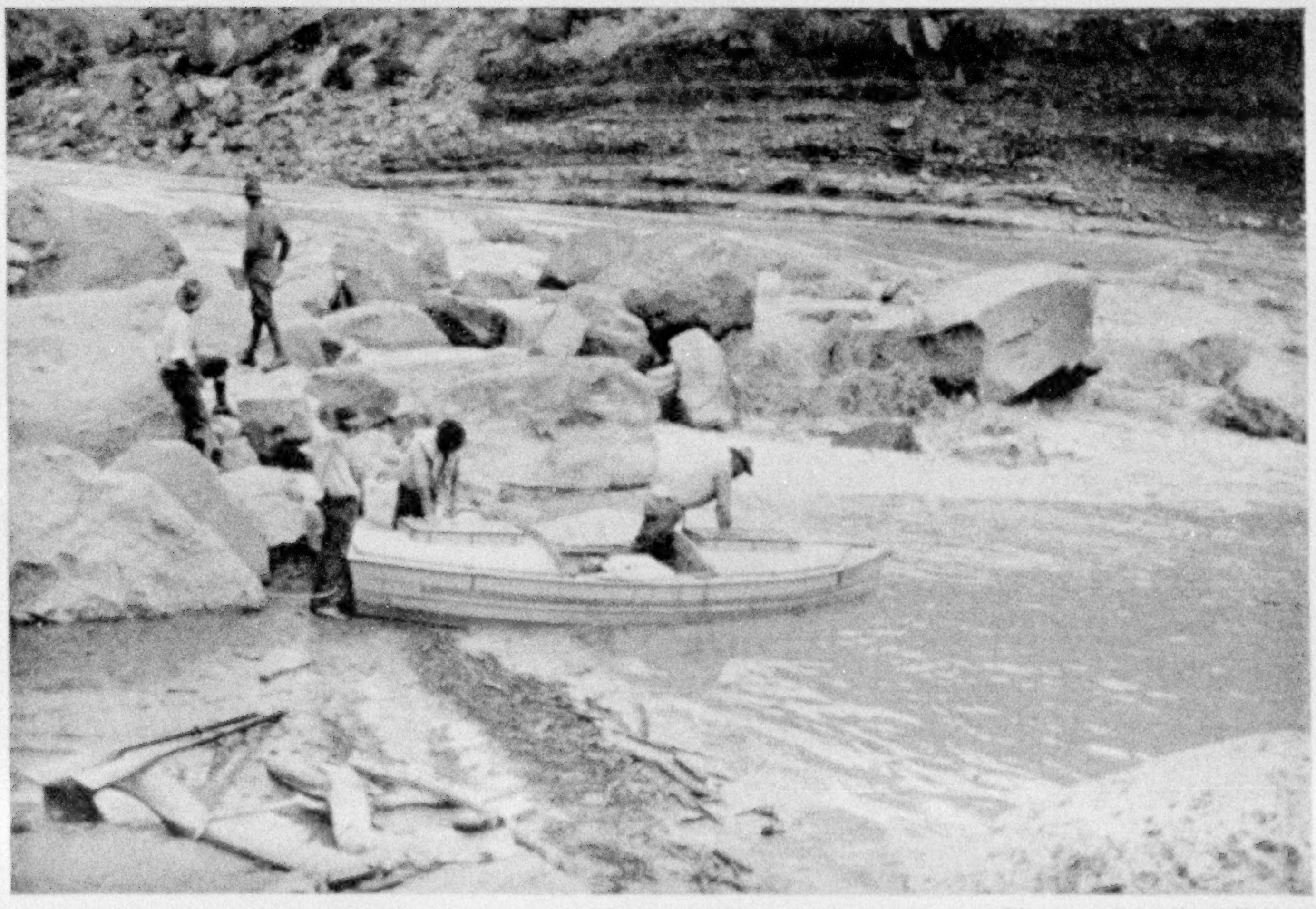
A receiving radio set had been included in the outfit for two reasons: on the chance that it might bring us warning in the event of a flood descending from above and as a possible source of entertainment. The publication of an article in a prominent radio magazine the week we left Flagstaff provided a new line of interest. In this it was stated quite definitely that it was impossible to receive radio messages in any deep, sheer-walled natural depression. As we were about to enter the deepest gorge of this kind in the world, an unparalleled opportunity would be offered to put this theory to the test.

In spite of the interference of daily thunderstorms and terrific heat radiation from the Painted Desert, our set gave good service from the day it was set up at Lees Ferry. The broadcastings of KHJ of a Los Angeles newspaper always came in most clearly, but on several occasions we had stations as far east as Chicago. We had only four earpieces, but an amplifier improvised from a baking



Photograph by E. C. La Rue

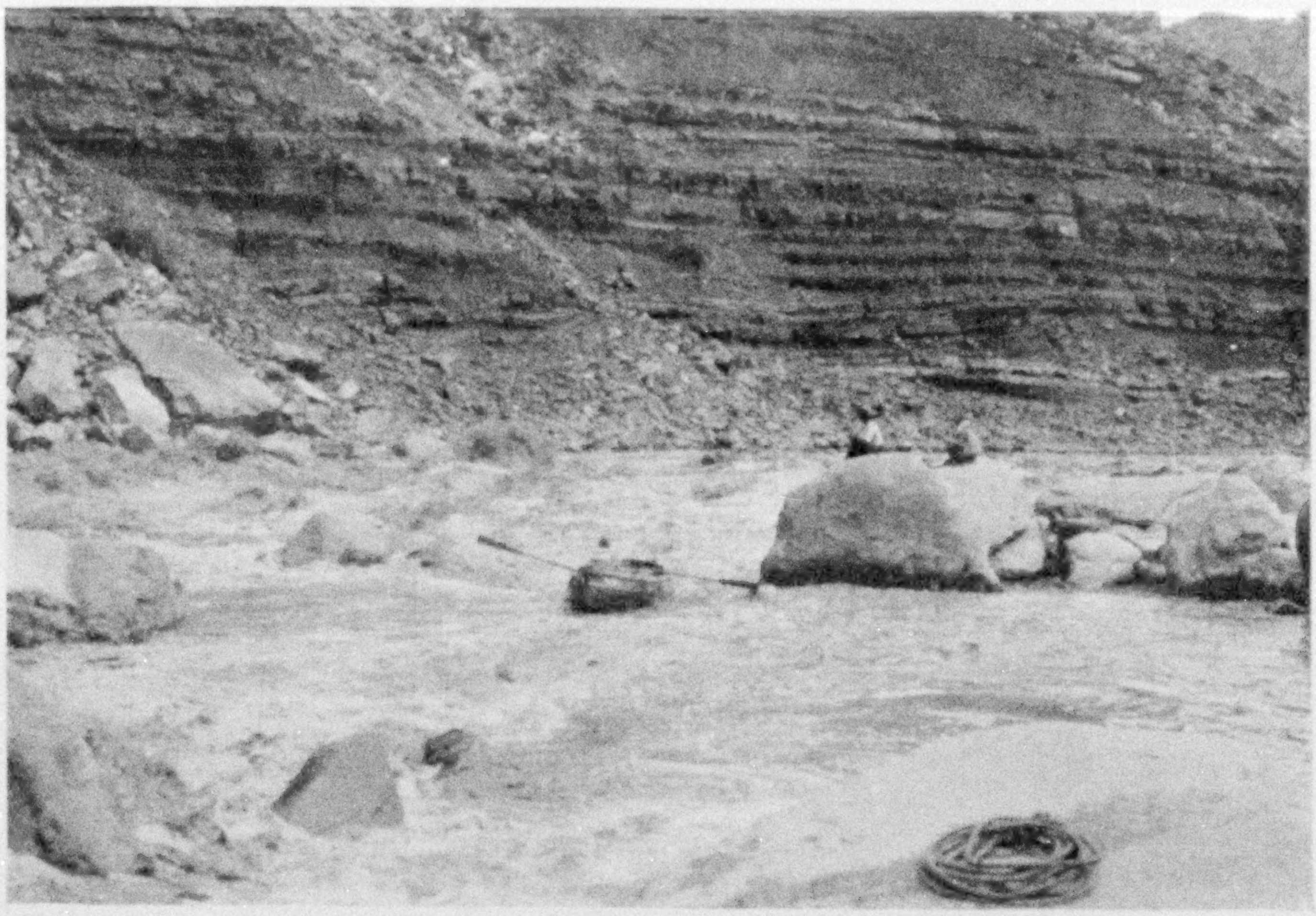
THE "BOULDER" BEING SKIDDED OVER THE ROCKS AT THE HEAD OF SOAP CREEK RAPID (SEE TEXT, PAGE 496)



Photograph by E. C. Kolb

THE "GRAND" AFTER PORTAGE AT SOAP CREEK RAPID

Left to right: Moore, Birdseye, Blake, Lint, and Burchard.



Photograph by E. C. Kolb

THE "BOULDER" RUNNING THE LOWER PART OF SOAP CREEK RAPID

One man of the Stanton surveying party of 1889 lost his life in this turbulent stretch of water (see text, page 496).

powder can and a tin funnel offered entertainment for a wider audience on occasion.

THE BOATS NAMED AND ASSIGNED

Nomenclature of the boats was a serious question, but after much discussion we decided to base it upon Colorado River canyons—gorges which we were to touch or pass through on the voyage. The new boat (see text, page 473, and illustration, page 472) was called *Grand*, the other two 18-footers *Glen* and *Marble*, and the 16-footer *Boulder*. The canvas boat received the name of *Mojave*.

To the *Glen* was allotted the duty of carrying the cooking outfit. Blake was to be its boatman and the cook its passenger. The *Boulder* was designated as survey-boat, to be handled by Lint, with Birdseye and Burchard as passengers.

The *Grand* was given to me to handle, with Moore and La Rue as passengers. Besides geology and hydraulics, we were to specialize on pictures. La Rue had a small moving-picture machine and two or three ordinary cameras. I had two cameras, to be used where they did not interfere with my boating work.

Kolb, with the *Marble*, had no passenger at the outset. Dodge was to carry the rod in the *Mojave*.

Of the four regular boatmen, Lint, Kolb, and Blake had put in several seasons of work in the Galloway-Stone boats; with some little previous rough-water experience, I pulled an oar in this type of boat for the first time. Dodge rowed well and was still more at home in the water.

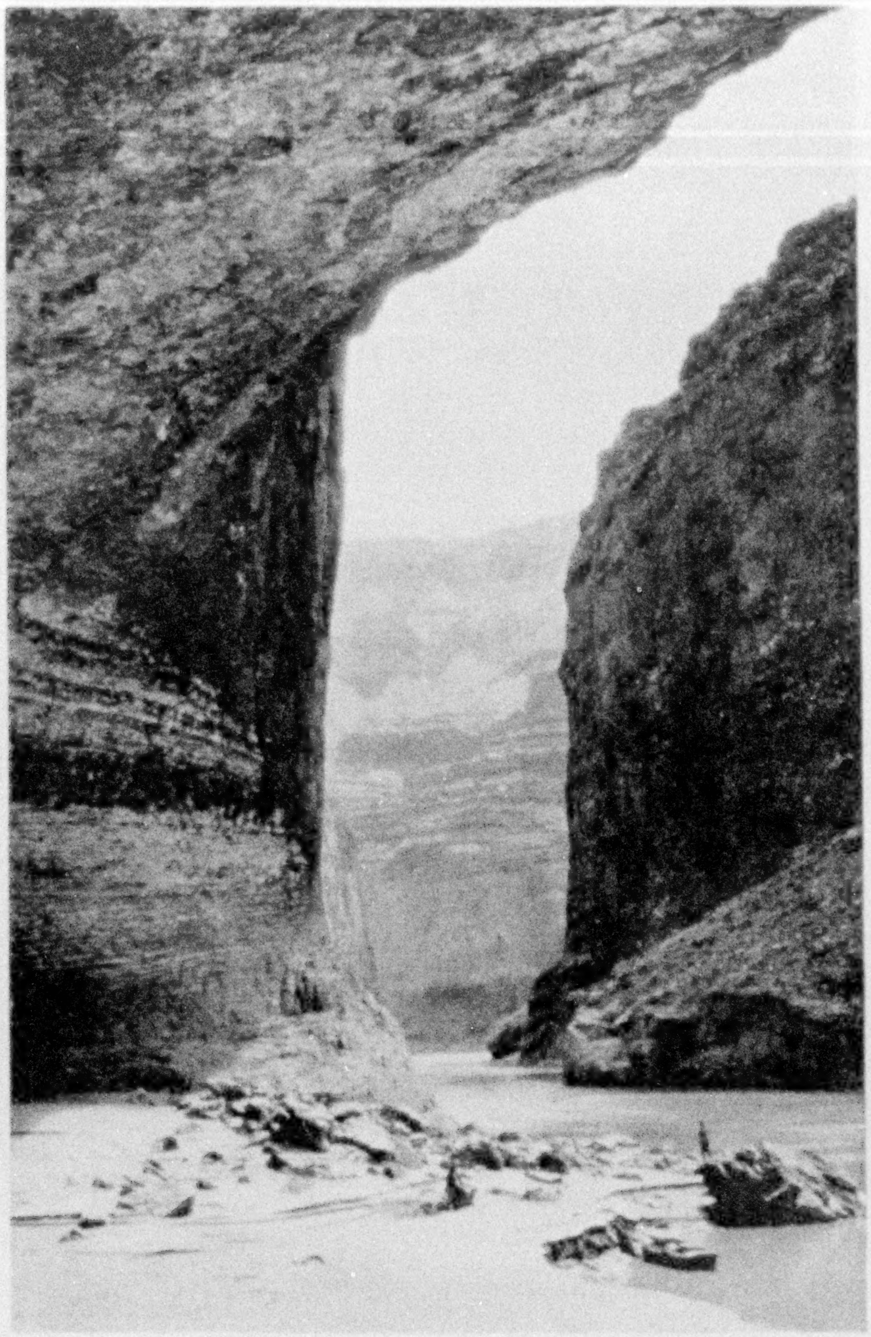
Of the engineers, Birdseye, Moore, and La Rue had done some rowing. Both the leader and the geologist had good natural water-sense and took to the river like ducks. Before the voyage was over either would have qualified for a boatman's job had the occasion arisen.

LAST-MINUTE SUPPLIES

A line on the multifarious needs of an expedition such as that upon which we were about to embark may be gained from a list of last-minute purchases which Roger Birdseye, our land manager, drove out to make in Flagstaff the final week in July. Although six months of study and thought had been put into the outfit, which was supposed to be complete when we came in a fortnight previously, there were about a hundred additional items that seemed desirable. Another formidable list was made up of things to be brought down to meet us at the foot of the Hance Rapid, below the mouth of the Little Colorado (see text, page 498).

The ability to secure necessities of every description in a comparatively short time was the outstanding advantage that this expedition had over those of earlier Colorado Canyon navigators. Powell's first party was able to replenish supplies only once after the start from Green River, Wyoming, and the second party only three or four times.

As the time for starting approached, it became evident that we must expect to cope with unseasonably high water. The river, which Mr. Cockroft, the Government hydrographer, reported as flowing from 30,000 to 35,000 second-feet during our first week at the Ferry, was still holding up around 25,000 second-feet at the end of the month—well above the normal for that time of year.



Photograph by E. C. La Rue

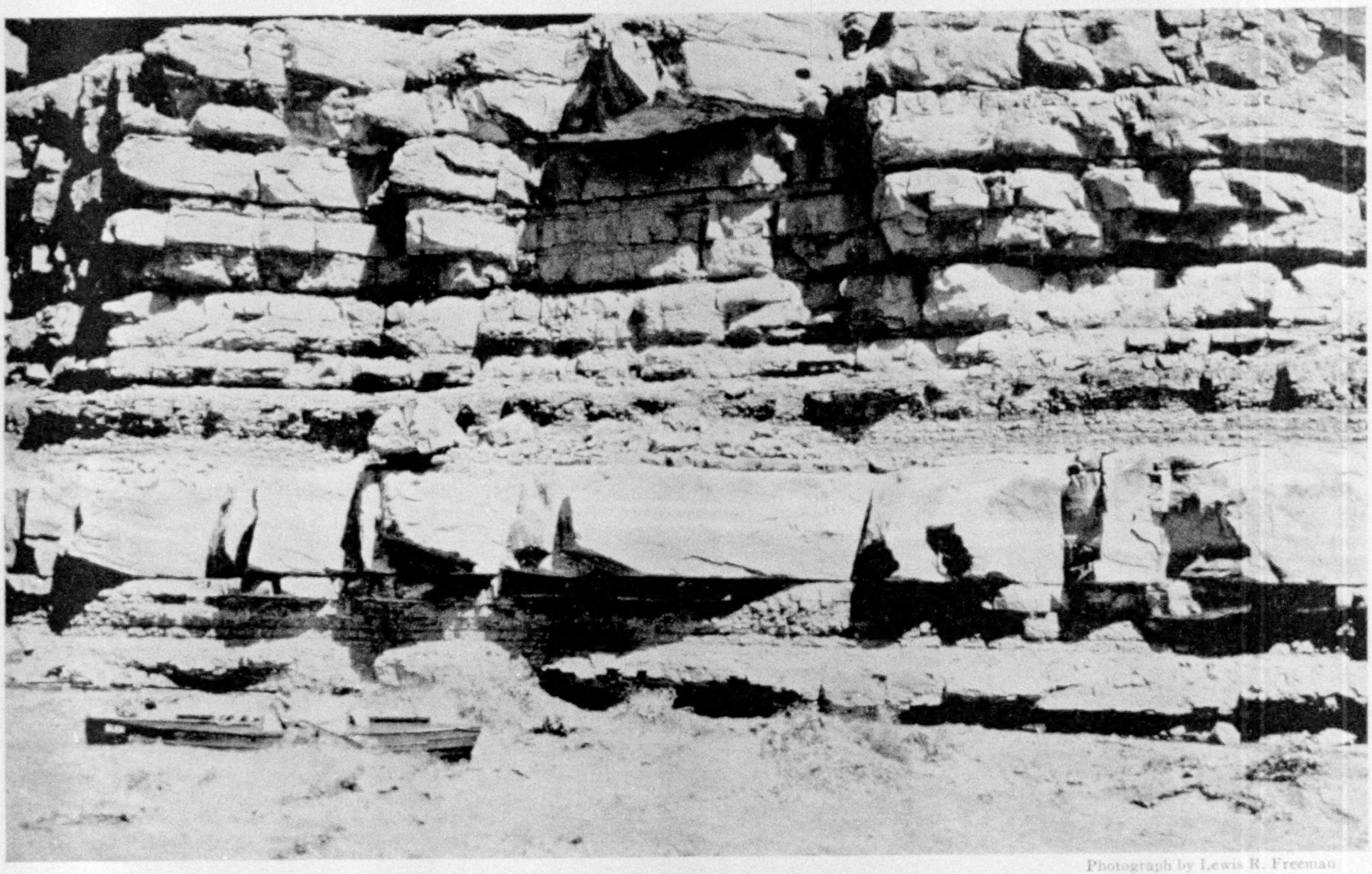
A DOWNSTREAM VIEW OF MARBLE CANYON: AT THE LEFT IS A BIG CAVE (SEE TEXT, PAGE 513)

Just how this condition would affect navigation was problematical. Generally speaking, extreme low water is considered safest, especially where there is much lining or portage to be done. With our heavy boats and loads, however, it seemed quite possible that well-filled gorges and deeply covered rocks might be desirable. This, like a number of other things, remained to be seen.

We had been provided with a manual of navigational information which had been compiled by Herman Stabler, Chief of Land Classification Branch of the Geological Survey, from a study of all available reports and accounts of previous voyages. This manual gave mileage, estimated falls of rapids, and data as to how other voyageurs had surmounted difficulties.

READY FOR THE START

By far the most complete record proved to be that kept by Frederick Dellenbaugh, of the second Powell expedition; but as this ended at the mouth of the Kanab, only about half of the Grand Canyon was covered. Excerpts from Powell's report of his first voyage were also included in Mr. Stabler's interesting record, as well



Photograph by Lewis R. Freeman

THE "GLEN" IN SOAP CREEK RAPID

H. E. Blake, in the cockpit, has about his neck an inflated rubber life preserver, worn by order of the leader while negotiating every dangerous rapid.

as notes from those of Stanton and the Kolb Brothers.

After packing and shaking down outfit most of July 31, we were ready for an early start on the morning of August 1.

The mountainous piles of supplies on the bank seemed sufficient to tax the capacity of a deep-seagoing freighter — enough to swamp our diminutive shallops many times over; but the holds of the latter admitted an astonishing amount of cargo, and we finally took everything needed without having to remove the safety air tanks.

With their full loads, all four boats were well down in the water, especially the *Grand* and the *Boulder*, which were carrying two passengers each. My boat seemed strangely heavy and slow in responding to the oars, as we swung out into the current, but that was partly from the contrast to the way it had responded when empty.

It was a morning of bright sunshine on the river, but above the gay slash of the Vermilion Cliffs piles of snowy cumuli were gathering for the afternoon thunderstorm. To the south the terra-cotta walls of the Echo Cliffs were etched with the cross-lights of the early sun. Astern the yawning mouth of Glen Canyon was a pool of purple shadow; ahead the portal of Marble Canyon was the beginning of a black gash cleaving the plateau like the wound from a giant's kriss.

"Out of the dark and into the dark,
With only a sleep between."

How well the lines described Powell's overnight camp at the mouth of the Paria! Even a boat that was showing an annoying tendency to work in toward the cliff below the old Mormon dugway could not quite take my mind off the pioneer canyon navigator at that moment. He had found easy going in the long quiet reaches of Glen Canyon, but ahead was the Unknown in the most sinister aspect it had yet assumed. He was too good a geologist not to read the warning in the changing formations, for he wrote:

"With some feeling of anxiety we enter a new cañon this morning. We have learned to closely observe the texture of the rock. In softer strata we have a quiet river; in harder, we find rapids and falls. Below us are the limestones and hard sandstones we found in Cataract Cañon. This bodes toil and danger."

To none of the later parties, including our own, was the menace of the canyons ahead what they were to Powell. We had the same rapids to face, to be sure, but their positions had been fairly well charted, and we knew that, in one way or another, they could be passed without prohibitory risk. We had ample food supplies and repairs, with replenishment always waiting a few miles ahead. Powell ran the whole length of the canyons of the Colorado with the shadow of the Unknown just ahead, and all of the Grand Canyon with the specter of Starvation clutching with grisly hand at the steering oar.

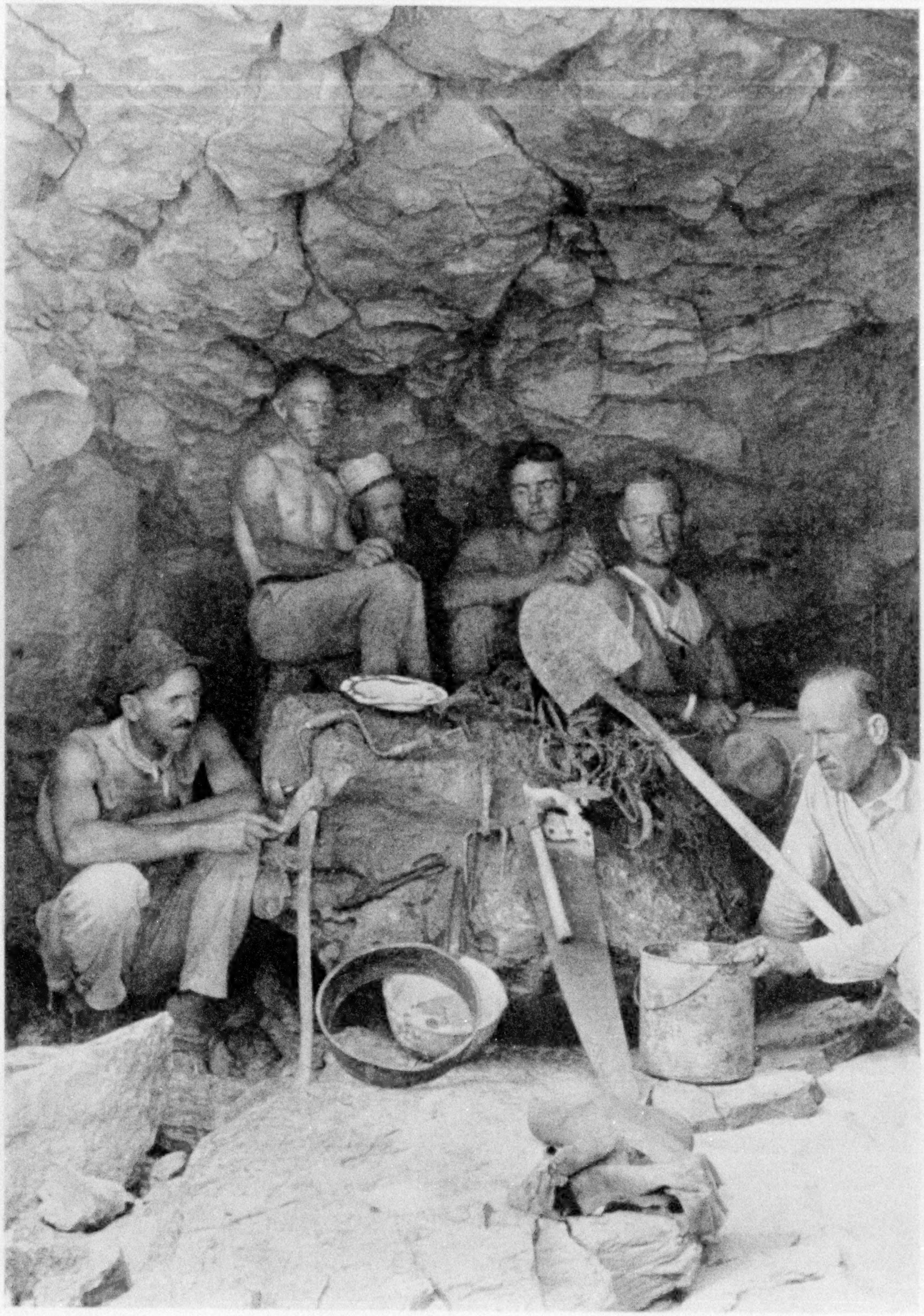
A FAREWELL CAKE

As we dropped down past the old stone houses of the hydrographer's station, Cockroft paddled out in his canoe and delivered a parting gift from his wife in the form of a cake. It bore some sort of a farewell message in white frosting on pink, all pegged on with toothpicks to keep it from slipping when it melted in the mounting heat.

Just below the dugway, where the first outcropping patch of limestone marked the beginning of Marble Canyon, Birdseye and Burchard landed and began work by tying the river line into the completed survey from Glen Canyon.

The rate at which Marble Canyon burrows its way into the bowels of the earth never fails to astonish the traveler entering it for the first time. The uprearing of the walls is due both to the rapid rise of the sundered plateau and to the fall of the river; mostly to the former. The river drops at the rate of about 10 feet to the mile, or 200 feet in 20 miles. At that distance from the head of the canyon the walls are 2,000 feet above the river, having risen at the average rate of 100 feet to the mile. Thus it would appear that, in this section of Marble Canyon, nine-tenths of the height of the walls is due to the rise of the plateau and one-tenth to the descent of the river.

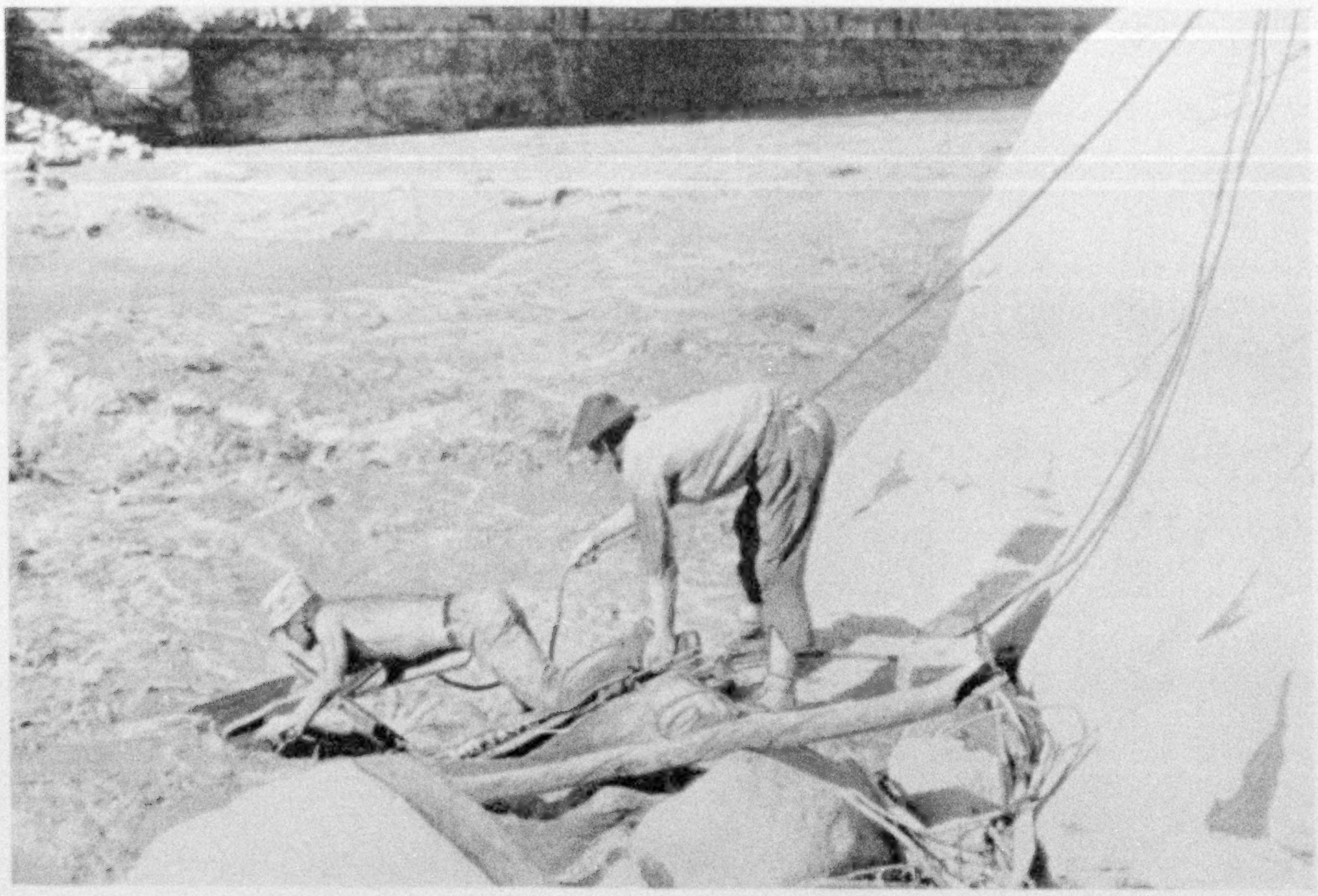
At three miles from the Paria we stopped to look over the first riffle of any size in the canyon. Some rocks showed at the surface near the head on the right, but were easily avoidable. The boats



Photograph by Lewis R. Freeman

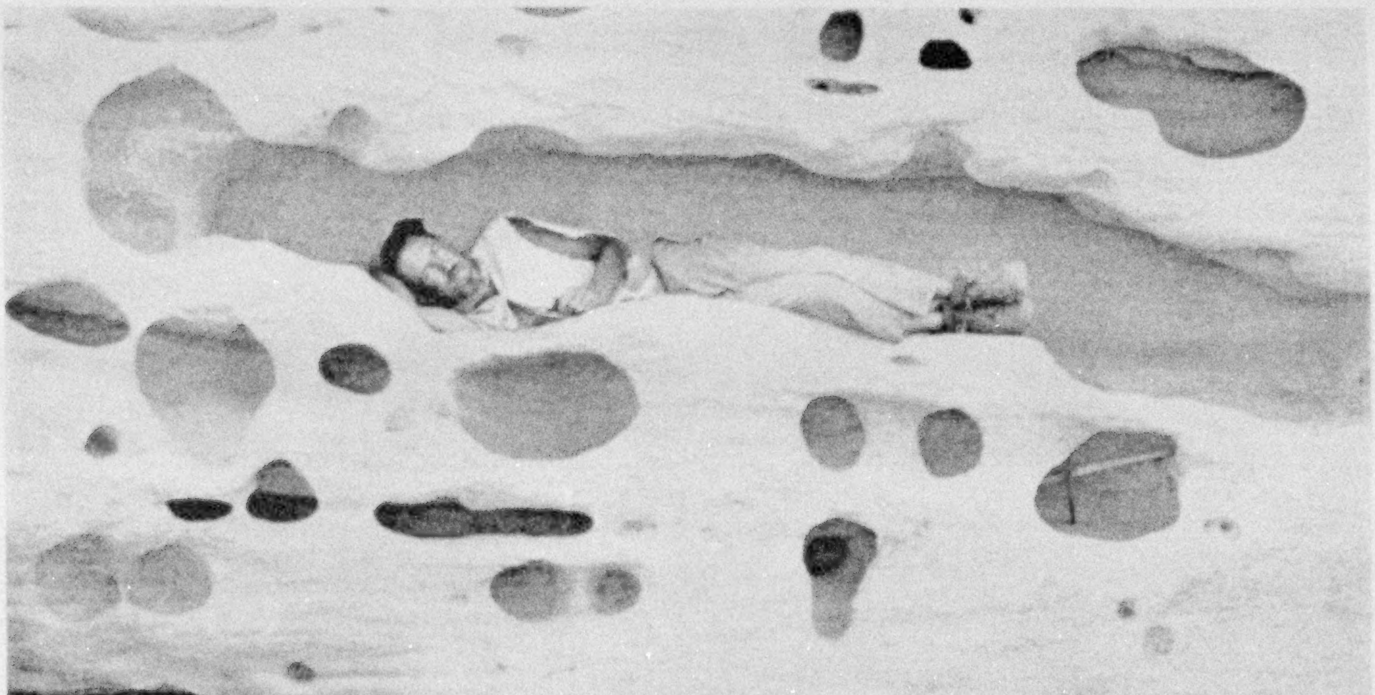
MYSTERY ENVELOPS THE FATE OF THE TRAPPERS WHO LEFT THIS EQUIPMENT

The cave in which these objects were found by the Grand Canyon Expedition is below high water mark, so that lighter articles must have been swept away. It is surmised that the owners' boat was lost in the rough water immediately below, now christened "Cave Rapid" (see text, page 510).



THE CANVAS BOAT "MOJAVE," WRECKED IN CAVE RAPID (SEE TEXT, PAGE 513)

Only one oarlock and some kindling wood were salvaged after the frail craft smashed on the rocks.

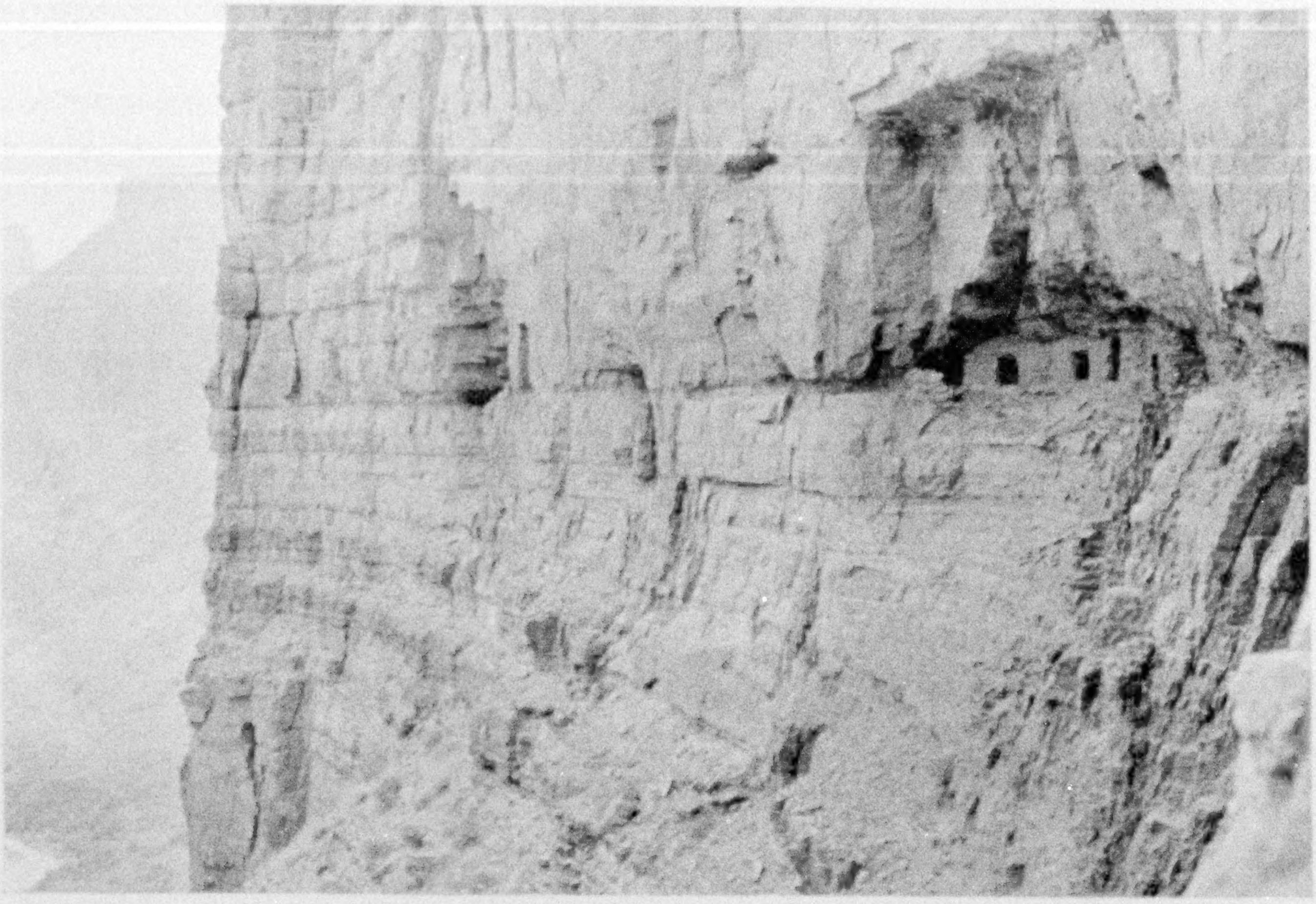


Photographs by E. C. La Rue

A HARD BERTH

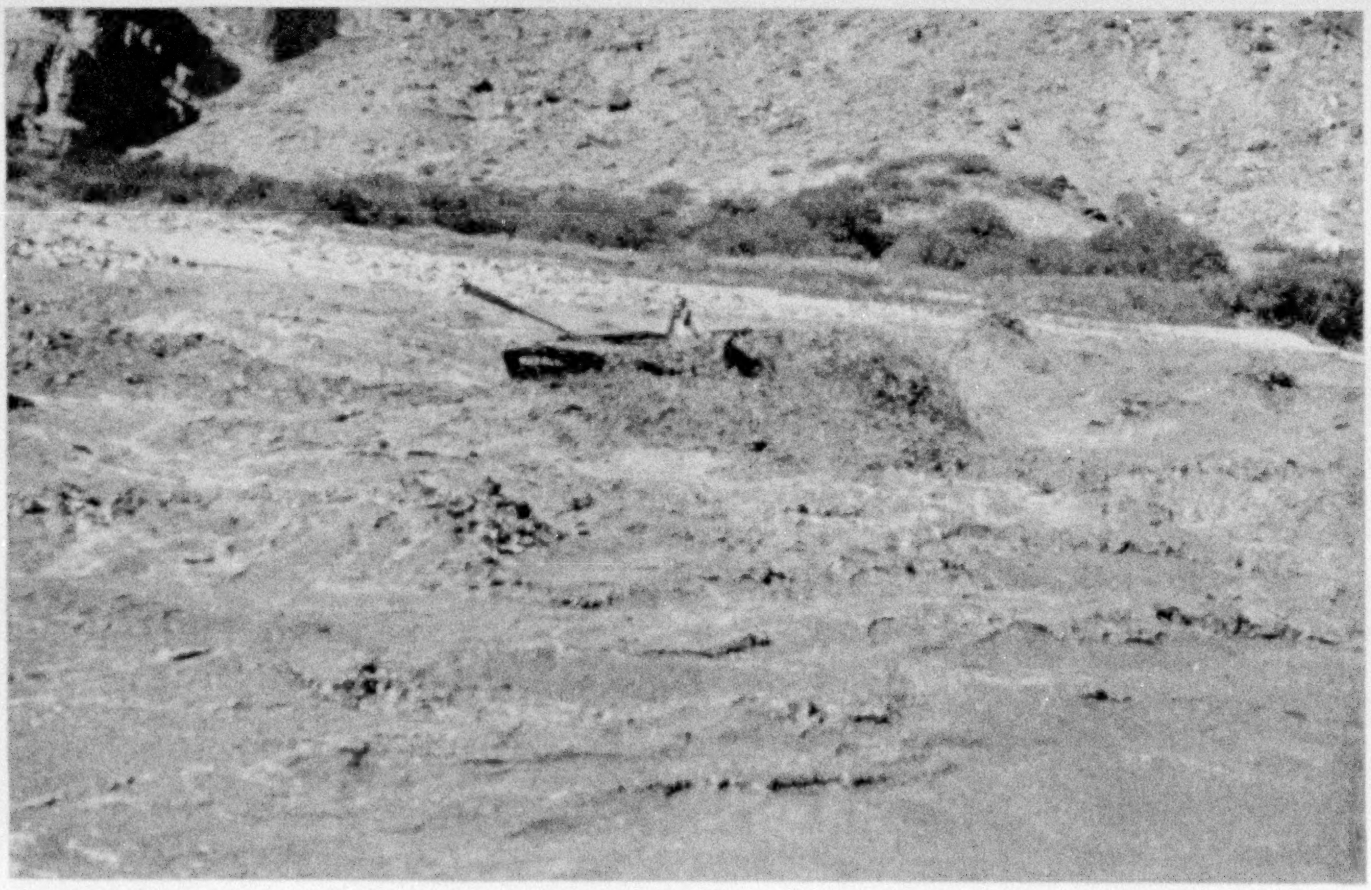
The water has carved oddly shaped recesses in the limestone which forms the wall one mile below the mouth of the Little Colorado River.

XUM



Photograph by E. C. La Rue

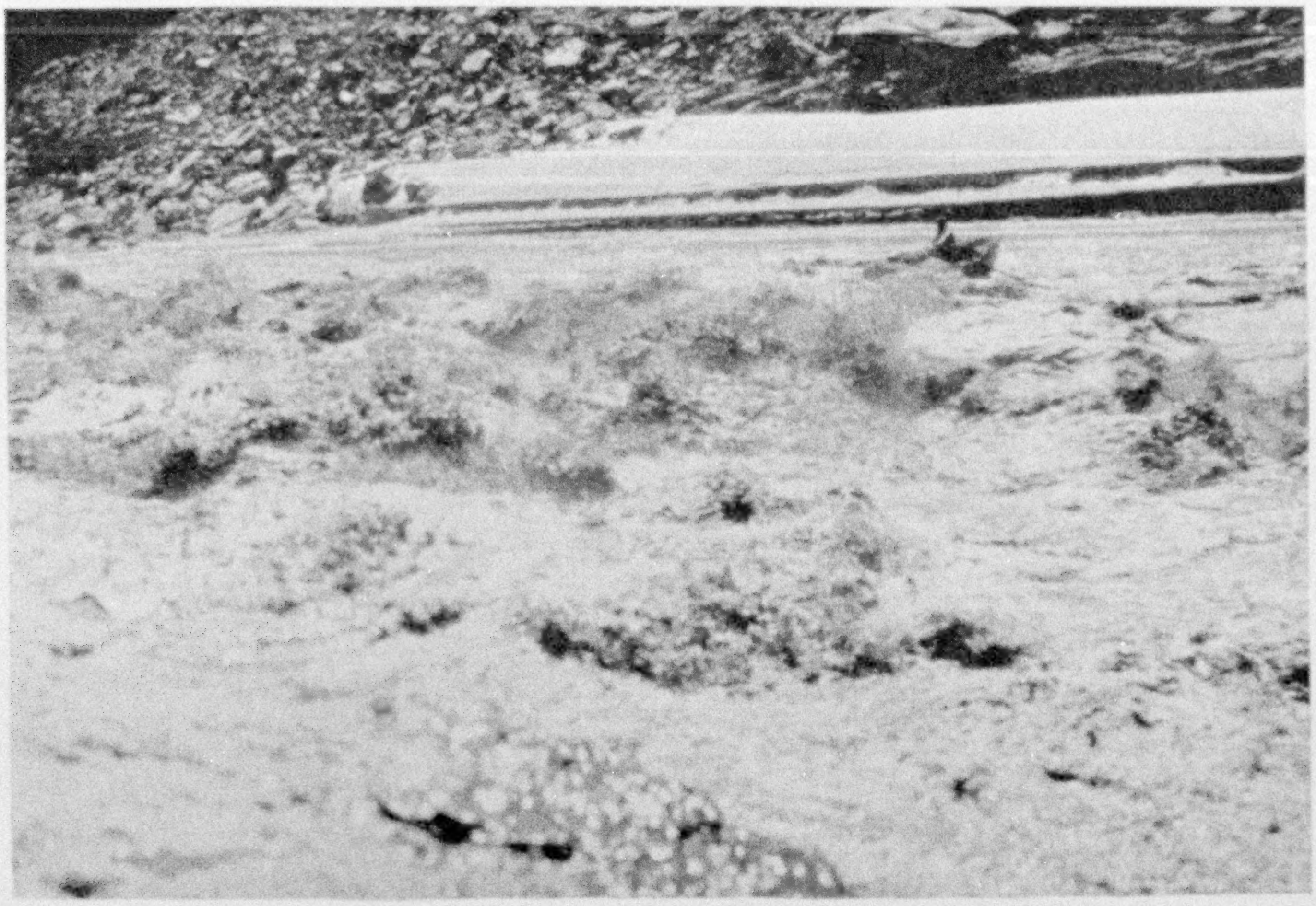
CLIFF DWELLINGS 600 FEET ABOVE THE RIVER, ON THE NORTH WALL NEAR NANCOWEAP CREEK, BELOW THE MOUTH OF THE LITTLE COLORADO



Photograph by E. C. Kolb

IN THE "MARBLE" IN KWAGUNT RAPID

The 1923 party encountered rougher water here than had any preceding expedition, due, in all probability, to an accession of boulders brought down the Kwagunt on the crest of some recent cloud-burst.



Photograph by E. C. Kolb

THE "GRAND" IN RAPIDS 11 MILES ABOVE VASEY'S PARADISE

Such a vast amount of sediment is carried down by the swift current of the Colorado that the rapids never froth white, but present uptossed ruffles of gray foam which when photographed resemble churned lava.

bobbed through at a lively rate, but without taking much water. We tied up for lunch at a so-called bridge site a mile farther down the river—a narrow section with abrupt walls nearly 500 feet in height on either side.

The bridge plan is an Arizona project for linking the two sections of that State now almost inseparably divided by the Grand Canyon. If the structure is ever built it will have no rival in height for a long time. It will be approximately 600 feet long and will be 500 feet above the water.

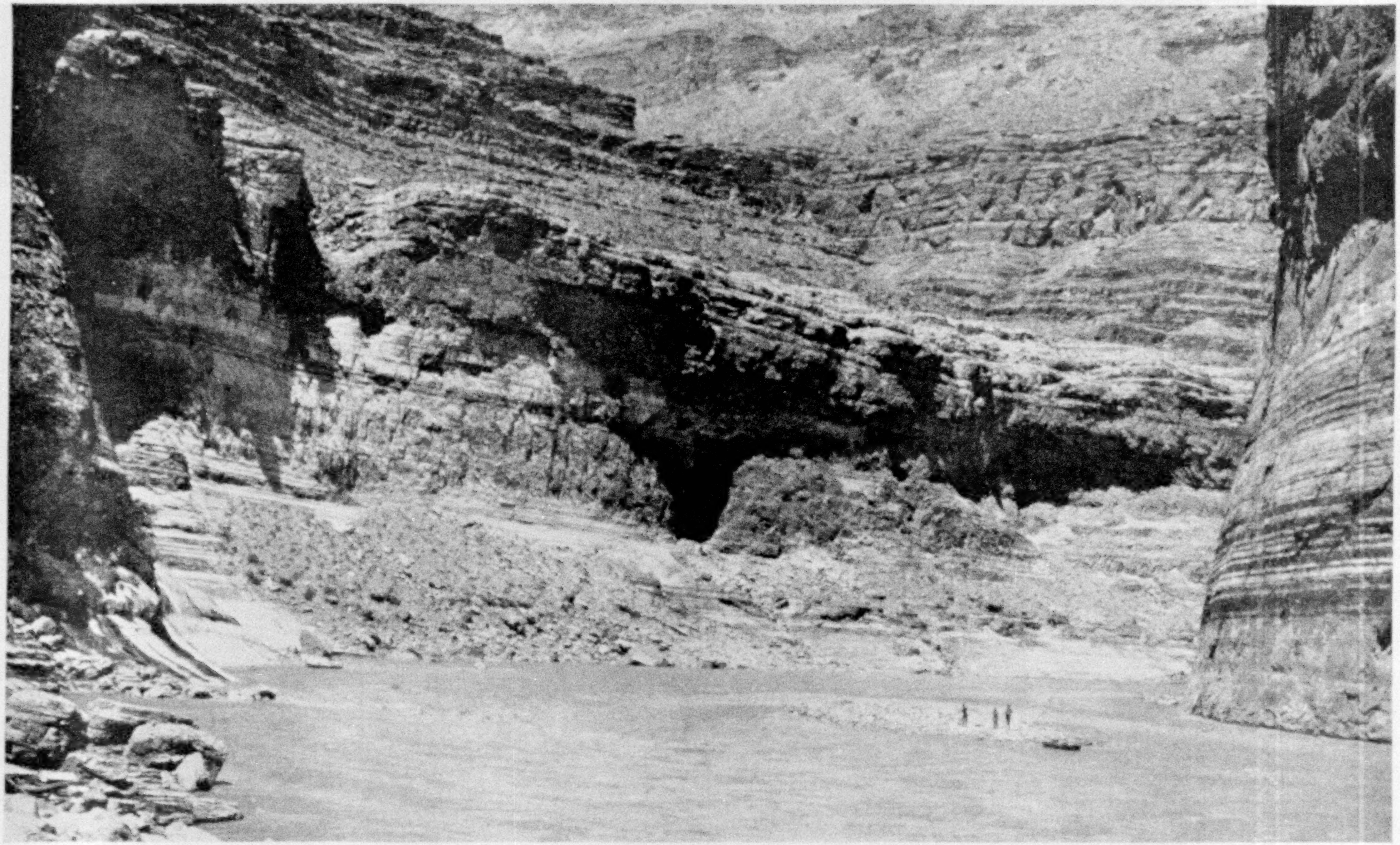
A THUNDERSTORM BETWEEN ROCKY WALLS

After running another small riffle, a half-mile pull in quiet water brought us in sound of a heavy roar which we knew to be that of Badger Creek Rapid. We came in sight of it 20 minutes later—an uptossed ruffle of gray foam (the Colorado's muddy current never froths white) beyond which the river dropped completely from sight.

Pulling in cautiously, we landed in a quiet eddy behind three large rocks, where a clean, white sandbar offered an attractive camp. We were just starting down to look over the rapids when a gathering thunderstorm broke in a heavy squall and forced us to seek shelter under projecting rocks. Thunder is never so impressive as between sheer rocky walls; likewise an incipient cloud-burst, especially when it puts down enough water to turn the opposing canyon rims into twin Niagaras.

One soon learns to seek his shelter away from low drainage depressions or under those parts of the cliffs stained black by transient storm-fed waterfalls. A deep undercut cave in the sandstone or limestone is the best shelter—provided it has no back entrance.

Powell had portaged boats and outfit around Badger Creek Rapid on both his first and second expeditions. Stanton had done likewise, both with the Brown party boats and those of his own expedition. The Kolbs had run with both their boats, but had struck a number of rocks in the course of a very bumpy passage.



Photograph by E. C. Kolb

LA RUE, MOORE, AND FREEMAN ON BOULDER ISLAND AT VASEY'S PARADISE

Delicately rather than brilliantly colored, the subdued pinks and yellows and browns make the cliffs below Vasey's Paradise unrivaled in the whole Grand Canyon, save possibly by those in the vicinity of the mouth of Havasu Creek (see text, page 513).

We were hoping to run if the stage was at all favorable.

Nine-tenths or more of the rapids in the Colorado River canyons are formed by dams of boulders washed out of side creeks. If the section where this occurs is a narrow one, the barrier will extend all the way across, usually making the resultant rapid steep and violent. In a broader section there may be room for the river to swing round the outer curve of the boulder fan with a comparatively unobstructed channel.

A FORBIDDING PROSPECT

At Badger Creek Rapid the dam thrown out from the canyon of that name has been reinforced and heightened by the cloud-burst discharge of a small unnamed canyon immediately opposite.

The rapid appeared decidedly rough as we looked it over, where it rumbled and tumbled in the deepening shadows of the cliffy walls above. From the right bank it was difficult to fix upon a course where a boat could be certain of avoiding rocks all the way through.

From an elevated vantage on the left-hand cliff the passage was more chartable. For two-thirds of the way across from the right bank the fall over the boulder barrier was too abrupt and too broken to give a boat a fighting chance of surviving a run. Then a deeper V of hard-running water cut through before the impassable boulder wall resumed again.

The channel through the V was closely beset by rocks from the very head, while half way to the foot of the rapid it led directly over a shallowly submerged boulder into a hole so deep that the bottom could not be plumbed with the eye. This would have to be avoided after dropping through the channel at the brink of the fall.

There were several places where it was possible for a boat to get into trouble; but with reasonably good luck and careful handling there did not appear enough risk to warrant resorting to the only other alternative — portaging boats and loads over 200 yards of slippery boulders.

PREPARATIONS FOR THE FIRST RUN OF A RAPID

The leader signified that he was willing to risk the boats if the boatmen were game enough to take a chance at a wetting. Half the battle in running a rough and rocky rapid is to put the boat into the head at the most favorable place. In many instances that—and keeping the boat stern-on to the current and waves—is almost all that is necessary.

The simplest way to test the set of the current is to toss driftwood in above and watch its course through the broken water. When this was tried as a preliminary to running, the following morning, the drift sent down the V at the head carried straight into the deep hole part way down to the foot. This meant that sharp pulling would be necessary to keep a boat from plunging into what appeared to be a place of real danger.

The preparations for this first run were made with considerable care. All cameras, instruments, and the radio set were kept out and carried to the foot of the rapid. The remainder of the loads was carefully trimmed before screwing down the hatches. Oarlocks were wired in to prevent the loss of oars in case of an upset, and baling buckets were secured on short lengths of line.

Nothing was left loose in the cockpits save the boatmen. The canvas boat was carried to the foot of the rapid and launched, to be ready in case of need.

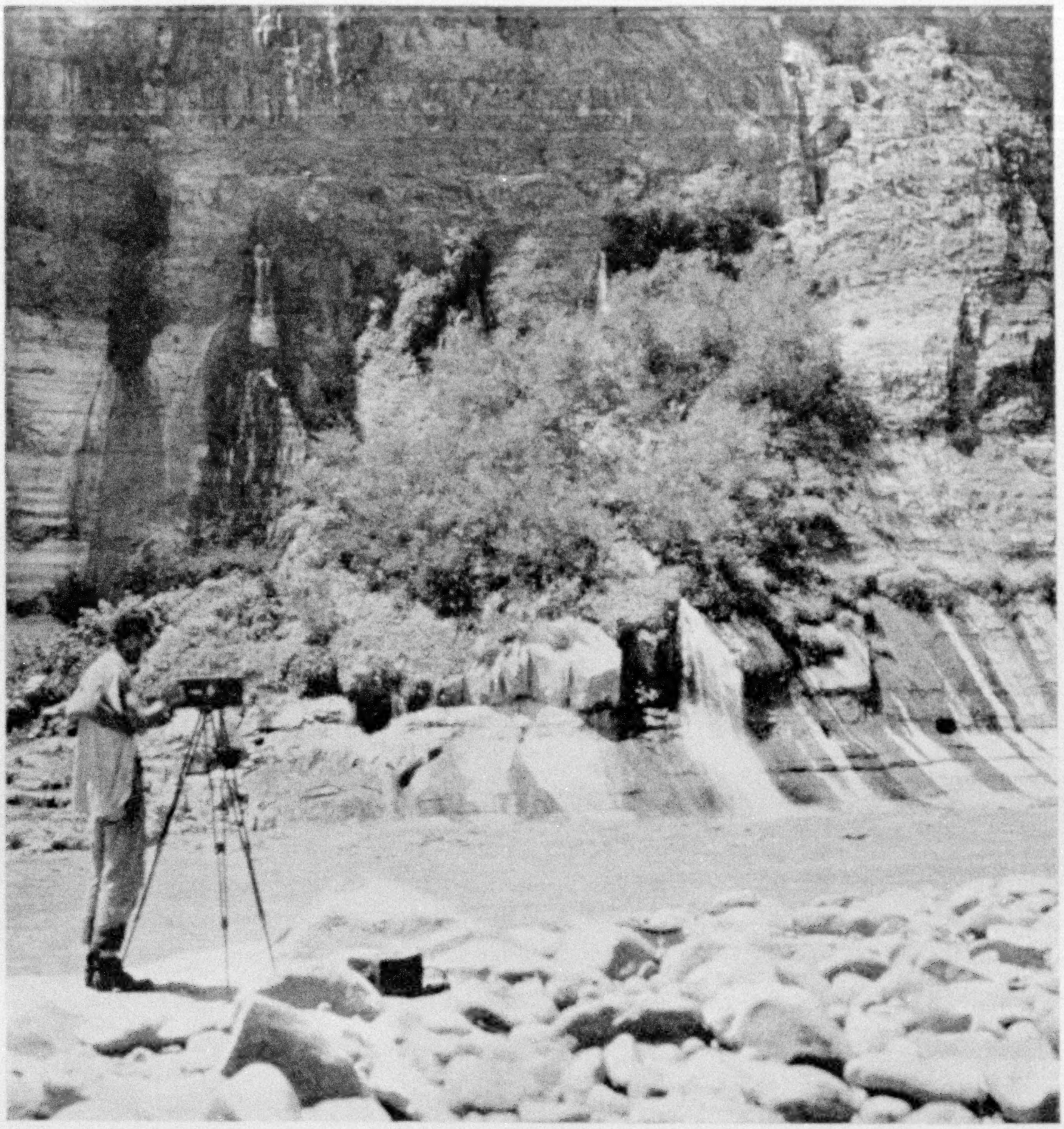
KOLB MAKES THE FIRST RUN

The opening run was far from auspicious. Kolb dropped into the V just as planned, so far as avoiding the big boulder on the left was concerned. He missed this by half an oar's length, but failed to reckon with a slightly more deeply submerged rock just below. The *Marble* was not upset or hung up by the obstruction, but the blow dealt the bottom threw it partly out of control and prevented effective pulling. Swung half sidewise, it drifted over a rounded wave and dropped into the deep hole!

Almost disappearing in a cloud of spray, the boat reappeared an instant later, partly filled but still riding buoyantly. Too far to the left to make the foot of the rapid on the right where the cameras and instruments had been portaged, Kolb pulled in and landed in an eddy against the opposite bank (see page 480).

Lint, following in the *Boulder,* hit the

XUM



Photograph by Lewis R. Freeman

LA RUE TAKING A PANORAMA AT VASEY'S PARADISE (SEE TEXT, PAGE 513)

"A patch of green shot with gushing jets of clear water."

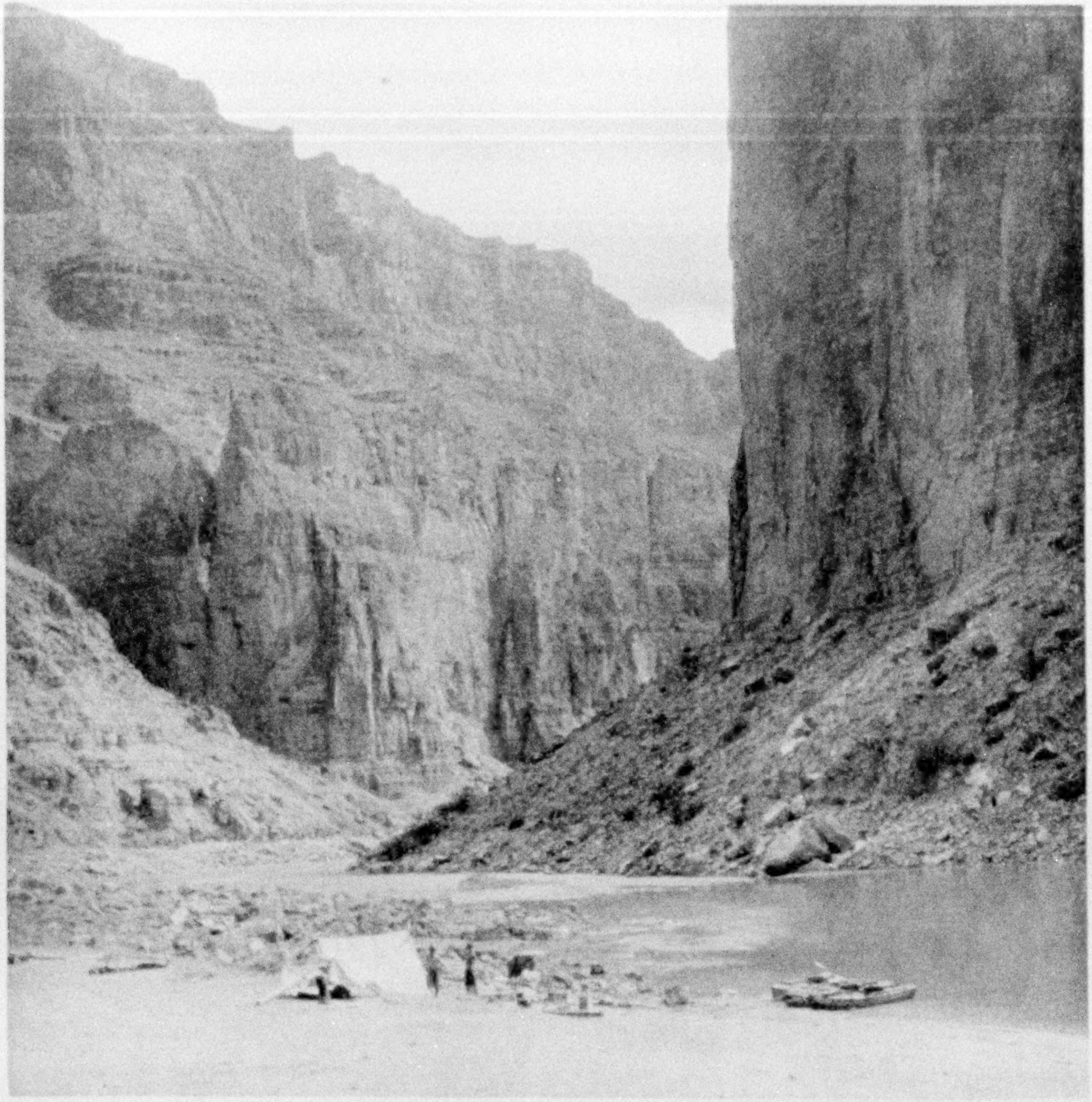
V just right and pulled away from the rocks with plenty to spare.

In drifting down, stern first, I took the *Grand* a few feet too far to the left and was carried back upstream along the bank. Circling round and pulling out of the back water, I swung to the middle of the current and dropped down to the brink of the fall again. The abruptness of the descent made the opening impossible to see until one was almost upon it, and then only by standing up.

Once the V began to open up, I sat down, pulled hard against the current setting toward the jutting rocks, and slid over the top.

The jolt of the first wave was a solid one and there was real weight in the piece of it that came bounding over the stern against my chest. Missing a stroke or two before recovering, I let the *Grand* swing quartering over the next comber, but had no trouble in bringing its head back upstream again and pulling well clear of the bad hole.

Blake, running last, was drawn somewhat to the right of the V, dropping down into a broken wave that swept com-



Photograph by Lewis R. Freeman

SITE OF A TWO DAYS' CAMP: A SANDBAR IN MARBLE CANYON

Here the party spent August 10th, the day set aside for the observance of the funeral of President Harding, news of whose death had been received by radio a few minutes after the tragic event occurred (see text, page 497).

pletely over the *Glen*, hiding it from sight for all of a second or two. It was in rough water for the next hundred feet, and then came out under good control.

KOLB'S BOAT PUNCTURED

When Kolb came to examine his boat he found that the after hold was several inches deep in water. Investigation showed that the bottom had been punctured near the bulkhead, doubtless by the rock hit at the head of the rapid. Sugar, salt, oatmeal, and other things not in rubber sacks at the moment were wet, and considerable water had penetrated to the supposedly water-tight map cases. Fortunately, none of the sheets of the new survey had yet been transferred to the cases.

Powell had estimated the fall of Badger Creek Rapid to be 18 feet, while the Kolbs put it at 20. Burchard, of our party, found it to be 13.

Ours was the first voyage on which the fall of the rapids of the lower Colorado canyons was measured with precise instruments. From beginning to end, the earlier estimates were found to be far too

Photograph by E. C. La Rue

UPSTREAM VIEW OF THE GRAND CANYON FROM A POINT FOUR MILES BELOW THE LITTLE COLORADO RIVER

liberal. A guess at the fall of a rapid is almost invariably too high. The fall of a river in a given distance varies slightly between high and low water, it is true, but not enough to account for the difference between the actual descents and the estimates of earlier voyageurs. Moreover, both of Powell's voyages were made at approximately the same water stage as was that of last summer's survey.

The walls of the canyon, which were 730 feet above the river at Badger Creek, increased steadily in height as we proceeded, with an ever broader streak of maroon-chocolate Hermit shale showing as we penetrated deeper into the gorge.

About two miles below Badger Creek we came to a striking monument of dolomite in the middle of the river. It looked solid enough to be an outcropping of bedrock, but must have fallen from one of the higher formations. As it is not mentioned by previous navigators, and as the fracture from which it appears to have come has not weathered greatly, it is probably of very recent origin.

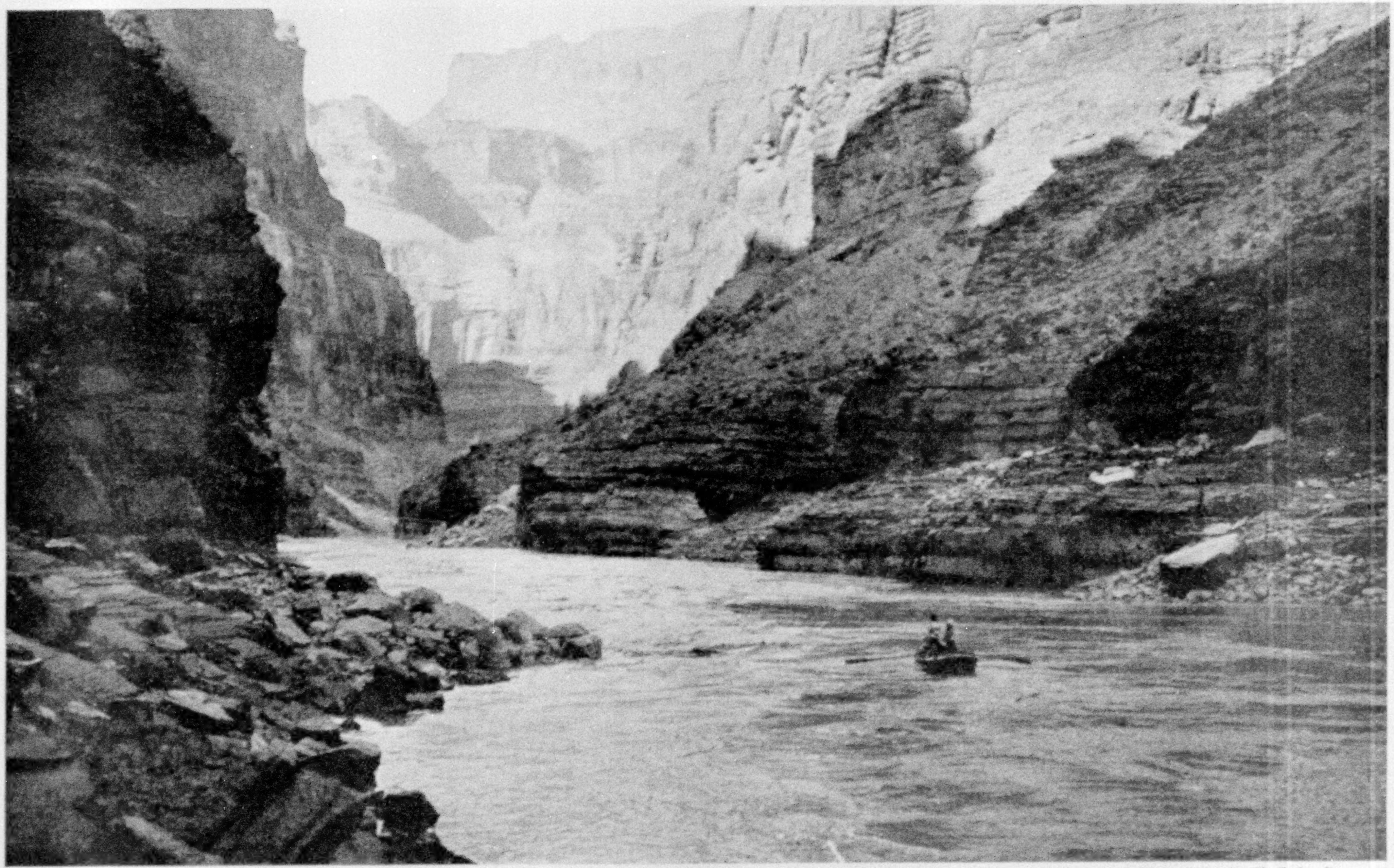
Upon reaching a long, straight stretch of canyon running east and west, we landed to photograph a great rectangular cliff which towered against the sky-line, revealing breaks at both ends, neither of which was positively identifiable as the course of the river.

A PORTAGE AT FATAL SOAP CREEK RAPID

A heavy roar became audible as we neared the bend, indicating the presence of the major rapid below Soap Creek—a mile or two nearer to Badger Creek than was shown by existing maps.

An extensive fan of white boulders — limestone — completed the identification of a rapid with one of the worst reputations on the Colorado.

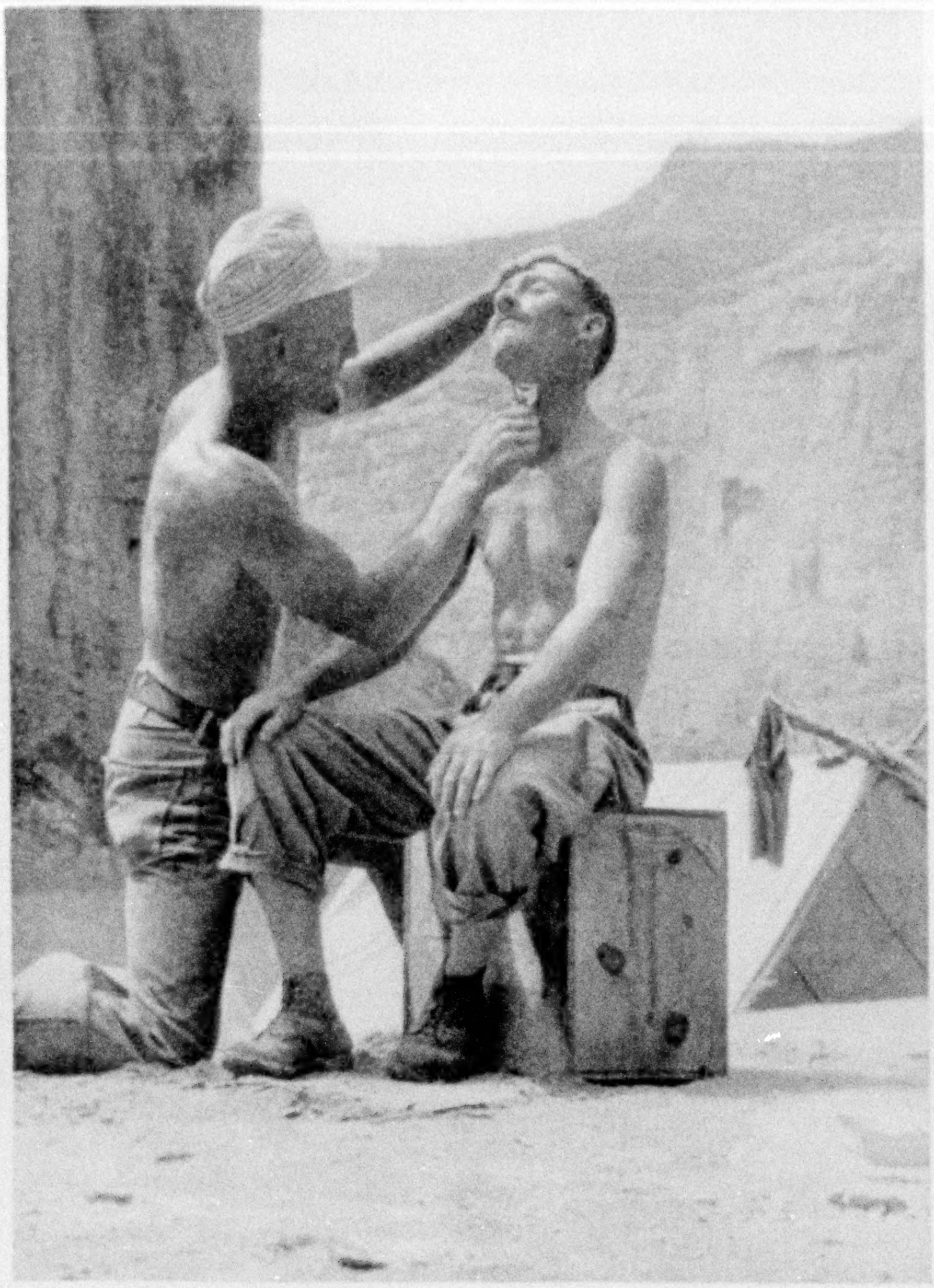
Landing, we picked a camp site on the right bank 100 yards above the break of the fall.



Photograph by E. C. La Rue

DOWNSTREAM VIEW OF GRAND CANYON FROM THE LEFT BANK AT A POINT 88 MILES BELOW THE LITTLE COLORADO

Navigation was comparatively easy in this stretch of the river, and from the mouth of the Little Colorado to the mouth of Havasu Creek (through Grand Canyon National Park), the expedition was usually three or four days ahead of schedule, making from five to ten miles a day compared with three or four in Marble Canyon (see text, page 520).



Photograph by Lewis R. Freeman

SPRUCING UP: DODGE CLIPPING KOLB'S BEARD

There is ample room to portage on the boulders to the right of Soap Creek Rapid, and both Powell expeditions had avoided the savage tumble of rough water in that way.

The railroad surveying party of 1889 also portaged its boats round the main fall, but shortly after launching them in the swirling waters below an upset occurred in which Brown, the president of the company, was drowned. Stanton did not attempt to run the main rapid when he came along in 1890, and Ellsworth Kolb in trying to do so suffered successive upsets with two boats. This sinister record has given Soap Creek Rapid a bad name.

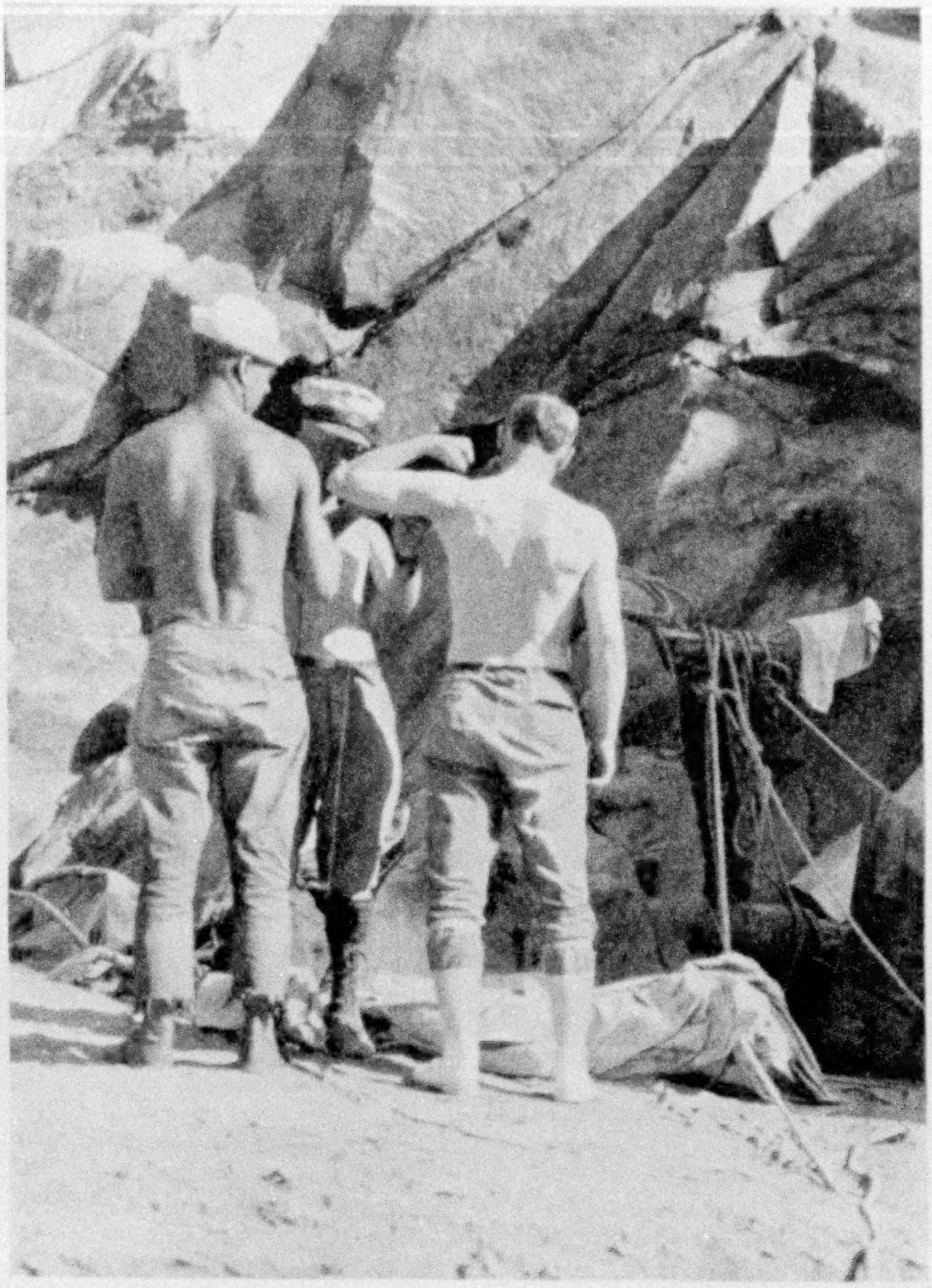
At first sight, while plainly of a greater and more violent fall than that of Badger Creek, Soap Creek Rapid looks no more dangerous to run. This is probably because the entering V is more clearly defined than in the rapid above and leaves but one course open; also due to the fact that the boulders under the great waves at the head are deeply submerged, except at extreme low water.

We loaded up in the expectation of running the following morning, but at the last moment Kolb returned from a trip across the river to announce that he considered it too risky; that he believed a boat would be almost certain to upset in one of the first two waves, and after that to drive upon rocks not visible to us from the right bank.

There was some disappointment at missing the chance to attempt what might have been the first successful run of this notorious rapid, but there would have been no point in taking undue risks with an outfit like ours, especially so early in the voyage.

The portage was a short one and the method of effecting it the same in the case of each boat. *Glen*, the cook-boat, was the first to go. It was taken down 200 feet under oars, lined another 100 feet farther, and unloaded. It was then lined empty 50 feet more to the head of the portage. This was across large boulders, over and between which large logs were laid at frequent intervals to prevent the sides of the boats from being crushed in as they were slid down. It was heavy work, yet not so punishing as it would have been with fewer men available (see illustrations, pages 481 and 482).

The boat was then lowered over a five-foot waterfall to a quiet pool at the end of the portage. Here it was launched and reloaded. It was then backed out of a sort of natural portal between two large rocks, and the rapid was entered on the right, just below the two big waves which had been avoided. The next 200 yards comprised a rough but not dangerous run. Then the boat was pulled into an eddy to a beach along the right bank. The *Grand* was brought down while dinner was cooking, and the two remaining boats in the afternoon, after which there was still time for a cooling swim and a rest before supper.



Photograph by E. C. Kolb

A STUDY IN TAN AND WHITE

Moore, during a noonday halt, is measuring the arms of Lint, browned by exposure, and Stabler, who had just joined the expedition.

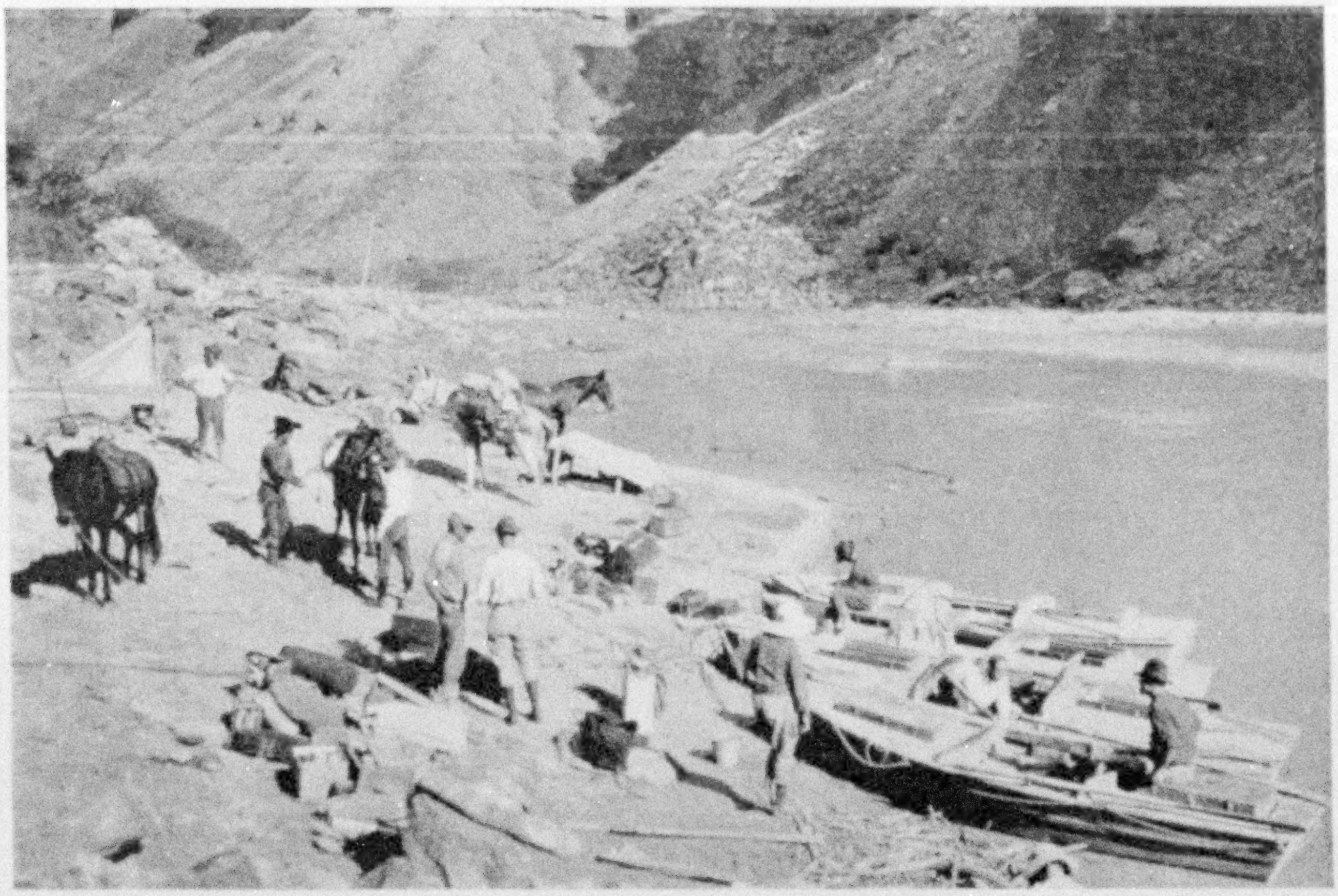
A TRAGIC RADIO MESSAGE

Radio had come in strongly at Badger Creek, but it remained for the 1,000-feet-deep section at Soap Creek to furnish conclusive proof of the fallacy of the theory that so profound a natural depression would prevent radio communication with the outside world. Station KHJ had warned us the previous night that it was planning to broadcast special messages to us on the evening of August 2. That was the night of our arrival at Soap Creek.

In preparation for the gala occasion, the aërial was carefully set up, with one end high on the side of a cliff, and orientated on Los Angeles. KHJ came in strong promptly at 9 o'clock, Mountain time, with little interference either from static or from the crashing roar of the near-by rapid. The lightning of distant thunderstorms was jazzing up the purple wedge of sky between the up-river cliffs, but, strangely enough, with scarcely any reaction on the instrument.

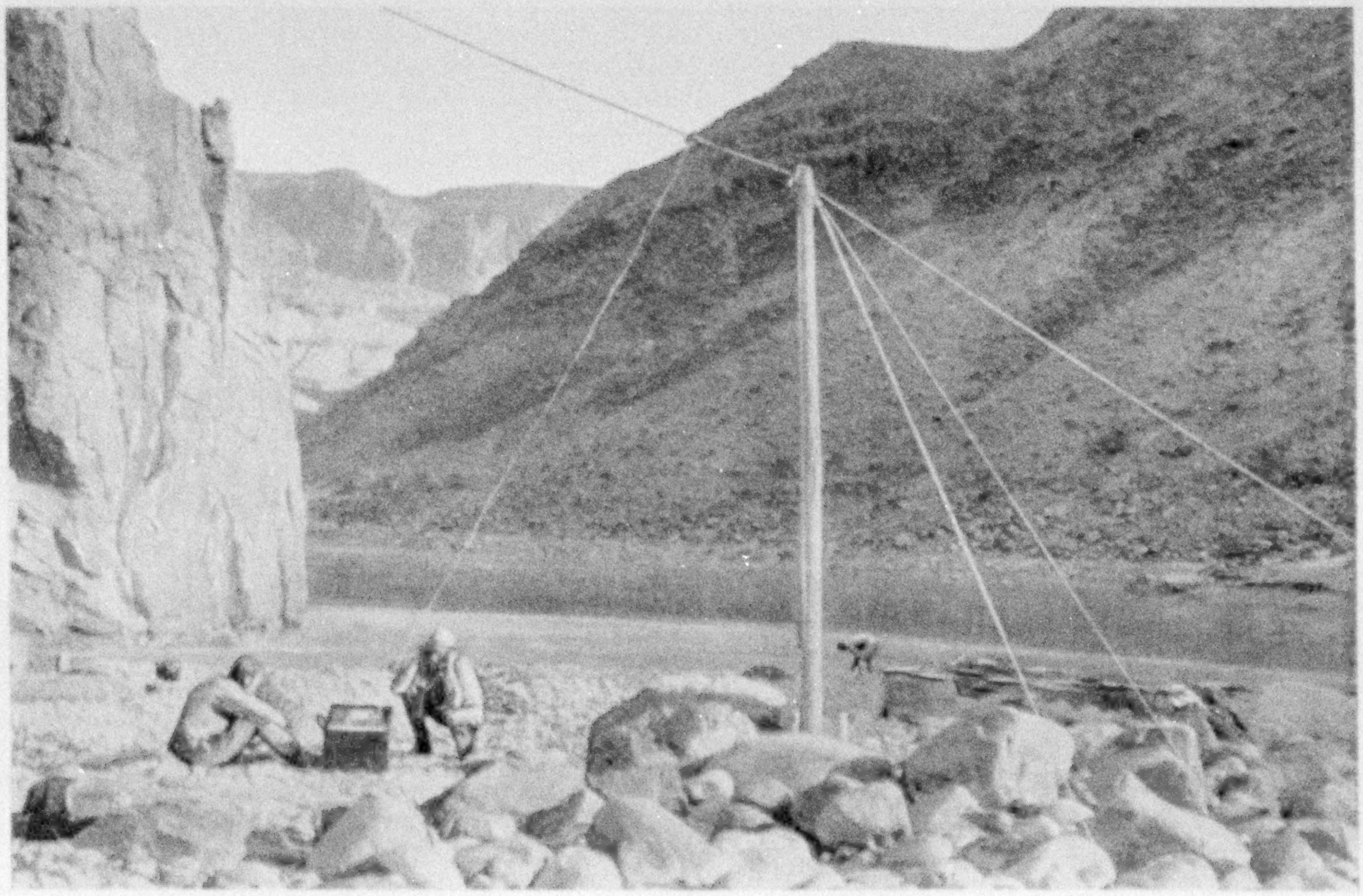
Baseball scores had come in and the daily grist of news was halfway through, when there came a sudden break, followed by a brief space of charged silence.

When the announcer resumed it was to state with deep emotion that news had just been received of the death of President Harding in San Francisco. This word was winged a dozen times or more during the next hour, once directly



Photograph by Lewis R. Freeman

PACKING UP FOR PORTAGE AT THE HEAD OF HANCE RAPID (SEE TEXT, PAGE 520)



Photograph by E. C. La Rue

RADIO MESSAGES CAME IN CLEAR AT ALL POINTS IN THE GRAND CANYON WHEN THE OUTFIT WAS SET UP

H. Stabler and C. H. Birdseye are "listening in" at Tapeats Creek. At El Tovar the leader of the expedition sent a telegram to Washington announcing that the party was safe; two hours later, in the depths of the canyon, he heard by radio his own message, as it was broadcast to the country.

THE PAINTED DESERT AND HOPI LAND IN THE DISTANCE

The view is from Navajo Point, on the edge of the Coconino Plateau (see map, page 474).

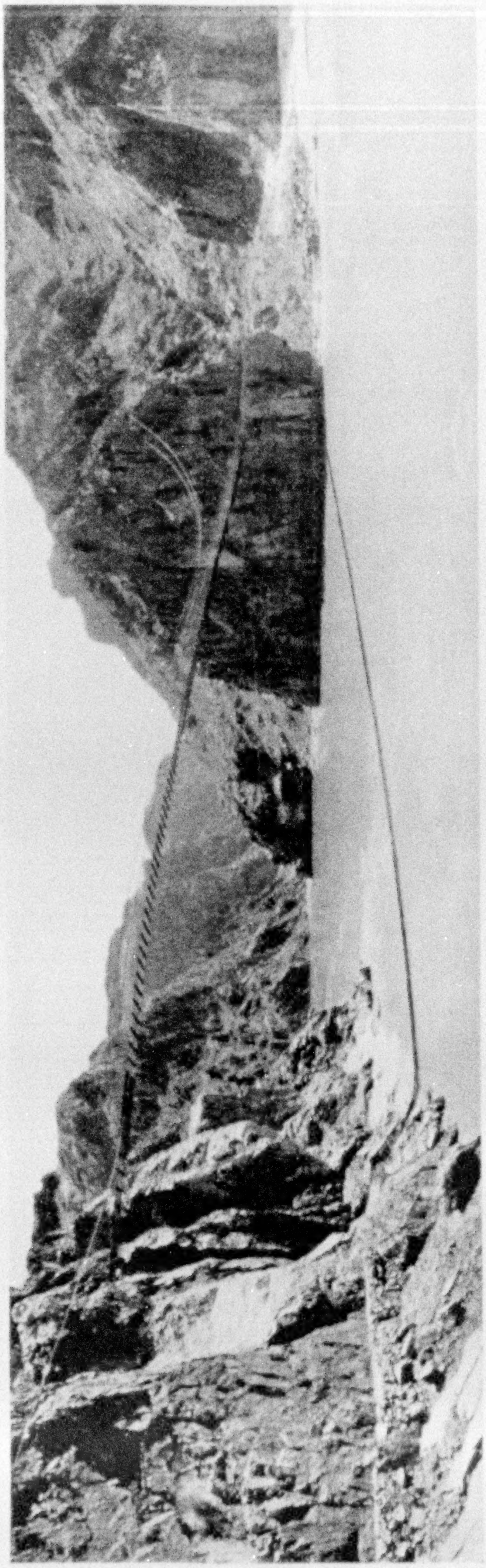
addressed to "the engineers braving the rapids of the Colorado." We had received our special message, though not the one expected.

RADIO WORKED PERFECTLY AT DEPTH OF A MILE

The first news of the President's death was received at about 8.15, Pacific time—perhaps forty-five minutes after the tragic event. Not one in ten thousand of the city dwellers of the country could have had the news at so early a moment. Colonel Birdseye announced at once that a day of rest would be taken by the expedition out of respect to the memory of the President. The exact date would be decided later, when the day of the funeral was learned over the radio.

Almost unconsciously the radio had come to be accepted as a regularly functioning unit of the outfit. Although occasionally affected by heat and local electrical storms, it continued to work just as well when the gorge of the Grand Canyon had deepened to a mile as it did the night it brought us the momentous message in the camp at Soap Creek Rapid. That it failed to pick up the many warnings of impending flood that were broadcast to us was not the fault of the outfit. It was enjoying a temporary rest while fresh batteries were being sent in (see page 524).

The fall of Soap Creek Rapid was found to be 18 feet. Earlier explorers had put it at 25, with waves 12 feet high.



Photograph by E. C. La Rue

LOOKING UP LOWER GRANITE GORGE FROM THE MOUTH OF BRIGHT ANGEL CREEK, SHOWING BRIGHT ANGEL SUSPENSION BRIDGE AND THE GEOLOGICAL SURVEY GAUGING CABLE

For an account of the construction of this bridge, which is 500 feet long and hangs 60 feet above the river in normal flow and 13 feet above the highest known water mark, see "The Grand Canyon Bridge," by Harriet Chalmers Adams, in THE GEOGRAPHIC for June, 1921.

The latter estimate is conservative, especially regarding the two big waves at the head of the first steep drop.

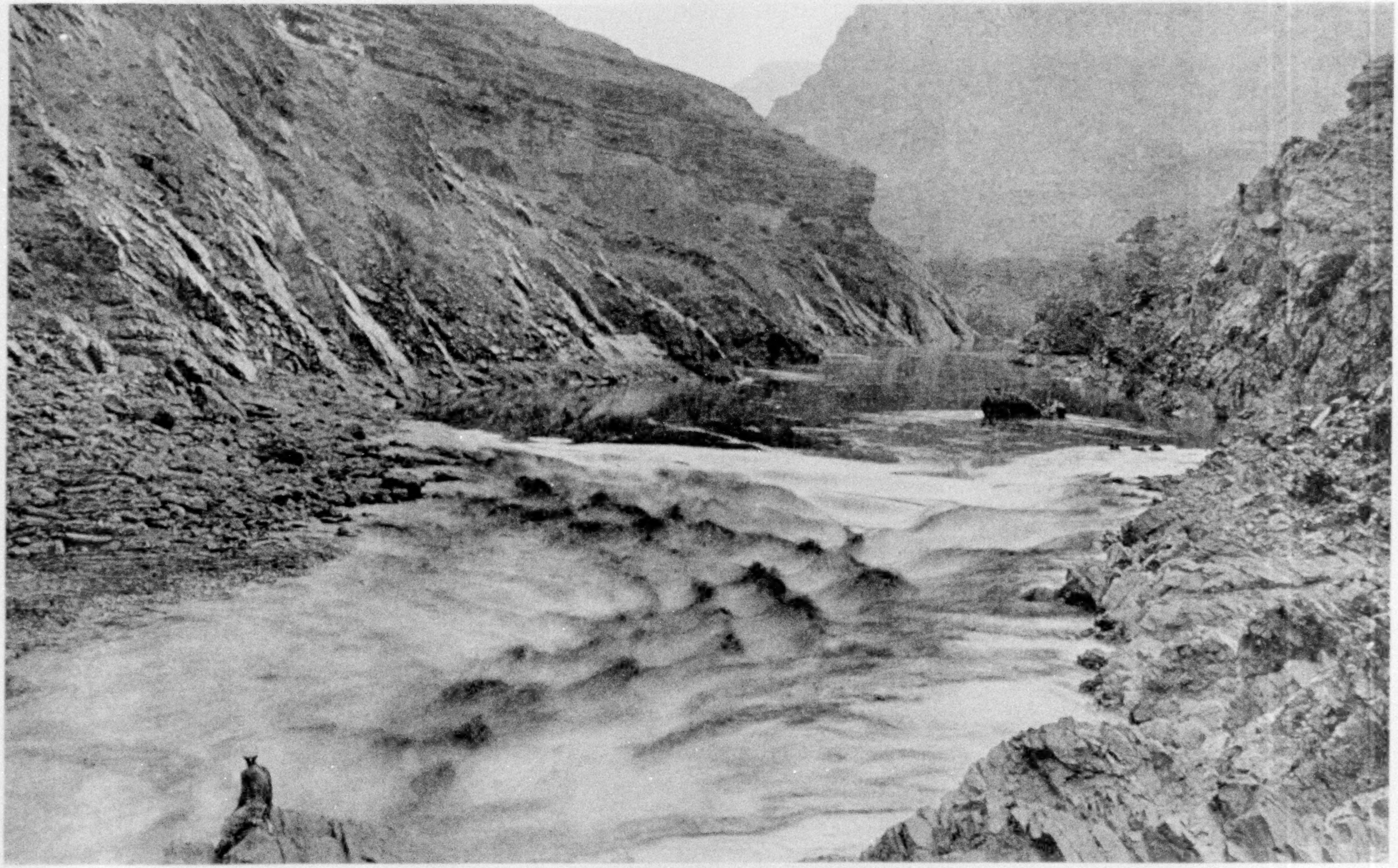
The waves of rapids are very difficult to measure. Estimates of the height of many we ran or narrowly avoided varied considerably, even among the engineers of the party.

For several miles below Soap Creek there is no water through which a well-handled open boat cannot be run without serious danger. The fact that an upset was responsible for the death of Brown, president of the company planning to build a railway through the Grand Canyon, is proof of the inadequate boats of his party. Stanton's perseverance with so poor an outfit, after the death of Brown, is one of the finest examples of fortitude in Colorado River history.

At noon on the 4th we halted for lunch on a shelf 100 yards above the head of a long and fairly rough rapid, the walls on both sides of which were so sheer that there was no chance of working along to reconnoiter. From the most favorable vantage point attainable, the upper section appeared to be readily runnable; a second riffle, disappearing around a bend below, could only be guessed at.

To Powell, on his first voyage, the place was calculated to awaken serious apprehension, and he ran it only after working his boats down along the wall to the head by a very ingenious and intricate piece of lining. In our case, knowing the rapid had been run a number of times without trouble, there was little to give pause.

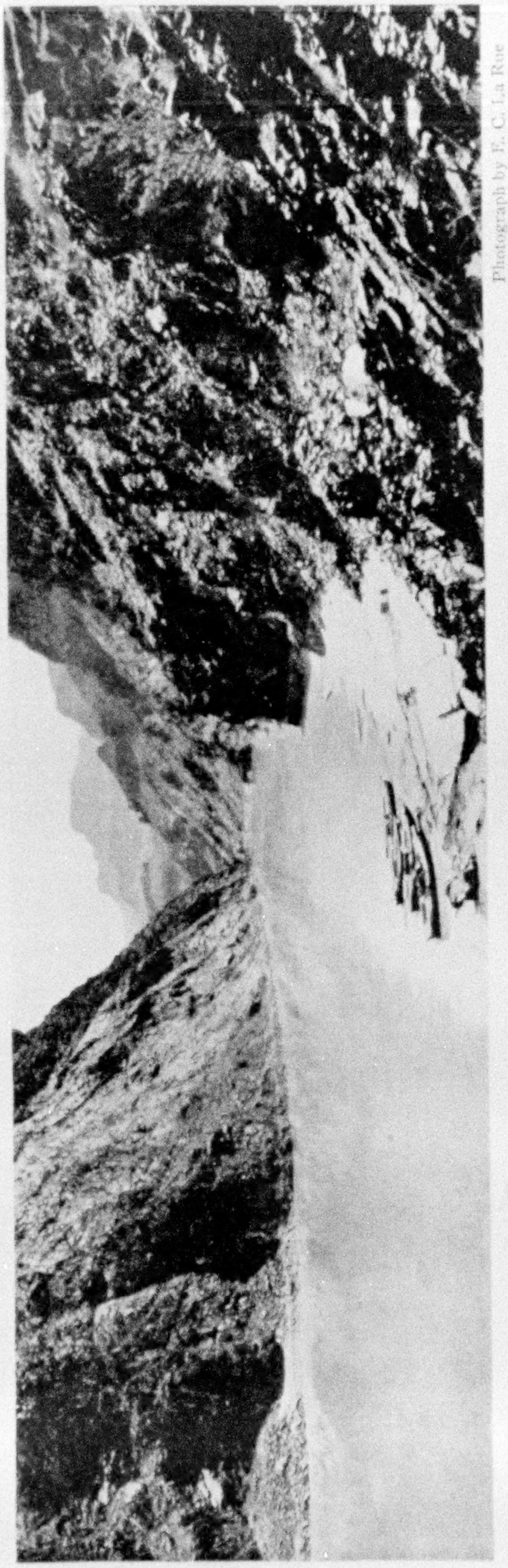
XUM



Photograph by E. C. La Rue

UPSTREAM VIEW OF A RAPID FIVE MILES ABOVE THE MOUTH OF TAPEATS CREEK

It was in this rapid that the author's boat, the *Grand*, came into collision with a boulder. The blow was so violent that he imagined his craft had "actually bounced back upstream from the impact." An incipient leak was effectually closed with a patch of canvas and some white lead.



Photograph by E. C. La Rue

UPSTREAM VIEW OF THE GRAND CANYON FROM THE LEFT BANK, AT THE MOUTH OF BOUCHER CREEK, ABOUT NINE MILES BELOW BRIGHT ANGEL CREEK

The *Grand* was the last boat to start. La Rue, who was casting off the painter, slipped on the smooth rock and all but let us swing off into the swift current without him. As there was no chance of going back, either by land or river, we never quite worked out how the party would have recovered its hydraulic engineer had he marooned himself.

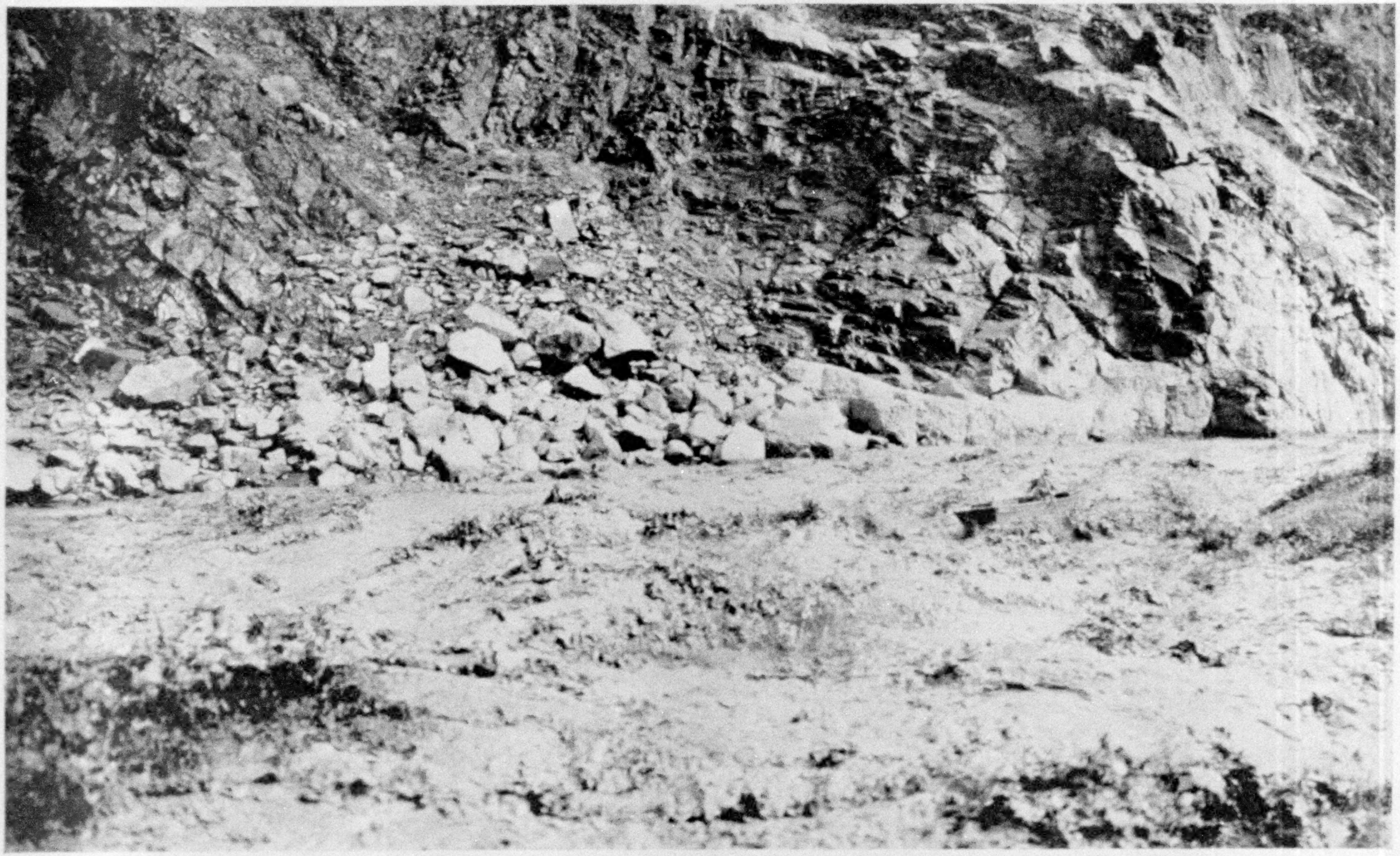
The canyon displayed points of rare beauty, with the Supai sandstone rising higher and higher from the water, and the Kaibab limestone and Hermit shale beginning to form a secondary wall behind.

Many caves had been formed by the undercutting of the cliffs. Pulling back into one of these to await the instrument, we lounged for half an hour in the cool depths, singing lustily to while away the time. Amazingly mellow-voiced we all were—thanks to the softening effects of the cavernous echoes.

We ran a rough major rapid just before going into camp that night, and a second immediately after lunch the following day. Both were much like Soap Creek in the way they rolled down steep pitches to undercut curving cliffs of the left bank.

All previous parties, including the Kolbs, had portaged at least one boat at the head of the latter rapid, which was somewhat more menacing from the fact that a second riffle began not far below to disappear in a tumble of broken water around the next bend. I had my first experience with the solidity of the bottom of the Colorado River at this point.

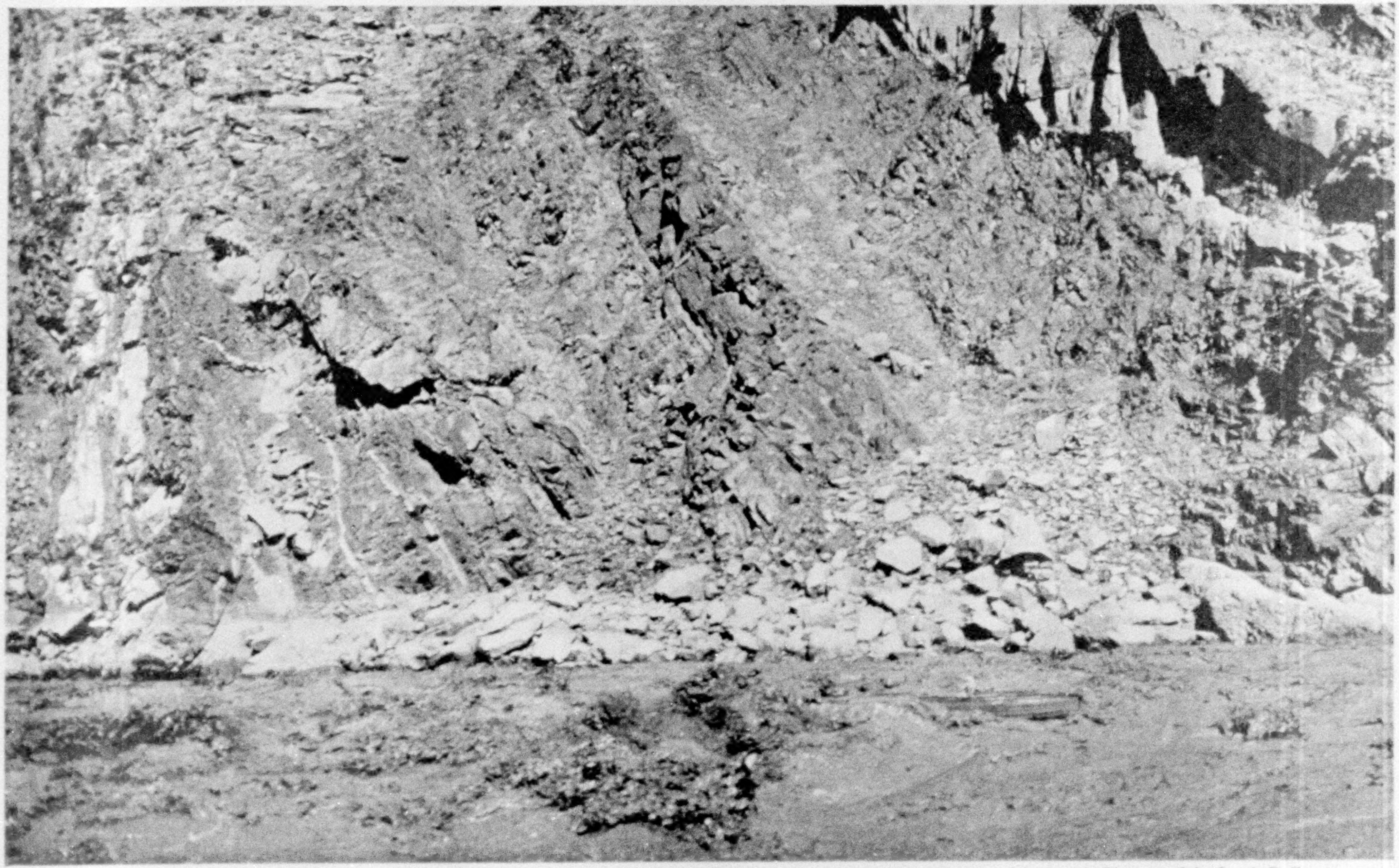
A heavy sandstorm was blowing out of the side canyon to the right as I drifted down to the head of the rapid, and in pulling against it I worked too far to the right and found the *Grand* dropping upon a bad mess of boulders almost under the bank. Hard



Photograph by Lewis R. Freeman

THE "BOULDER" IN WALTHENBURG CREEK RAPID

Although this rapid has a fall of 13 feet in a very short distance, making it one of the steepest of the Colorado River, it did not prove especially difficult to the Grand Canyon Expedition at the stage of water which the party encountered.



Photograph by Lewis R. Freeman

THE "MARBLE" IN WALTHENBURG RAPID, TWO MILES ABOVE TAPEATS CREEK

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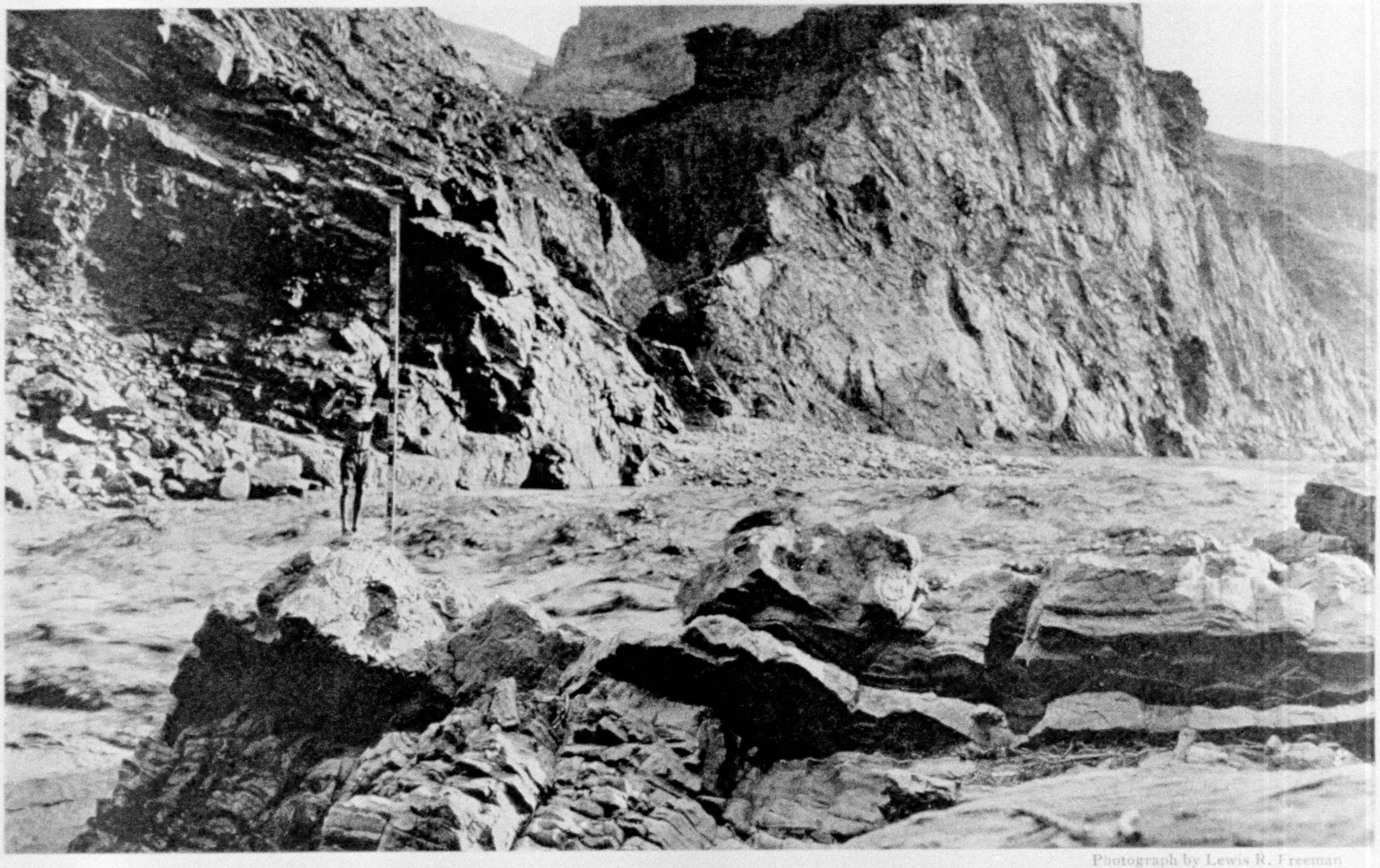
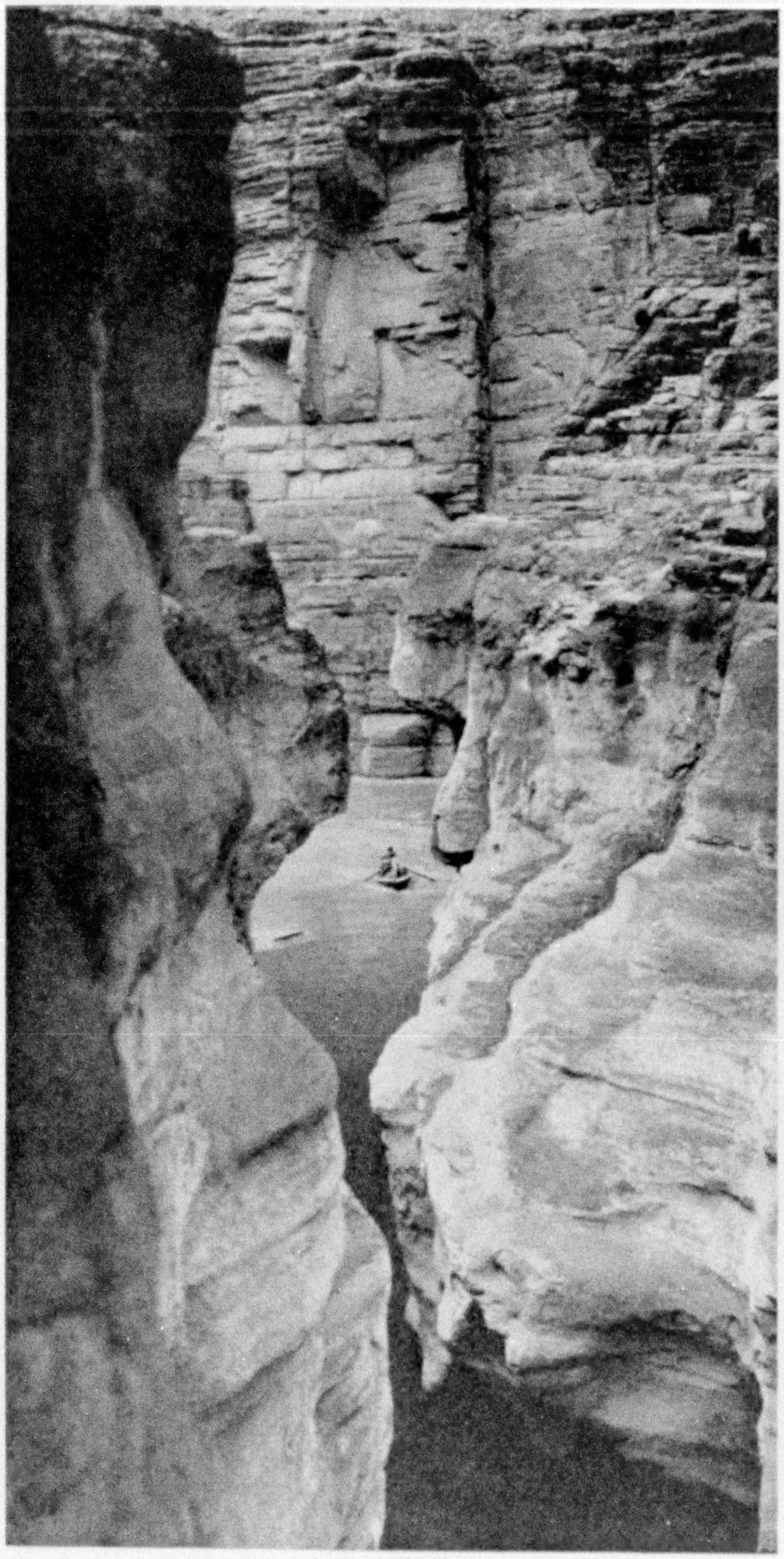


Photograph by Lewis R. Freeman

HANDLING THE SURVEYOR'S ROD AT WALTHENBURG RAPID

It was here that the Kolbs, on their photographic expedition of 1914, experienced a serious upset, with considerable damage to one of their boats.



Photograph by E. C. La Rue

DOWNSTREAM VIEW OF HAVASU CREEK, WITH THE COLORADO RIVER IN THE BACKGROUND

Framed between the overhanging walls is the *Boulder*, ready to land for supplies.

pulling did not quite carry me back to the channel, and as a consequence a corner of the stern bumped solidly against a rock, allowing the boat to swing completely round.

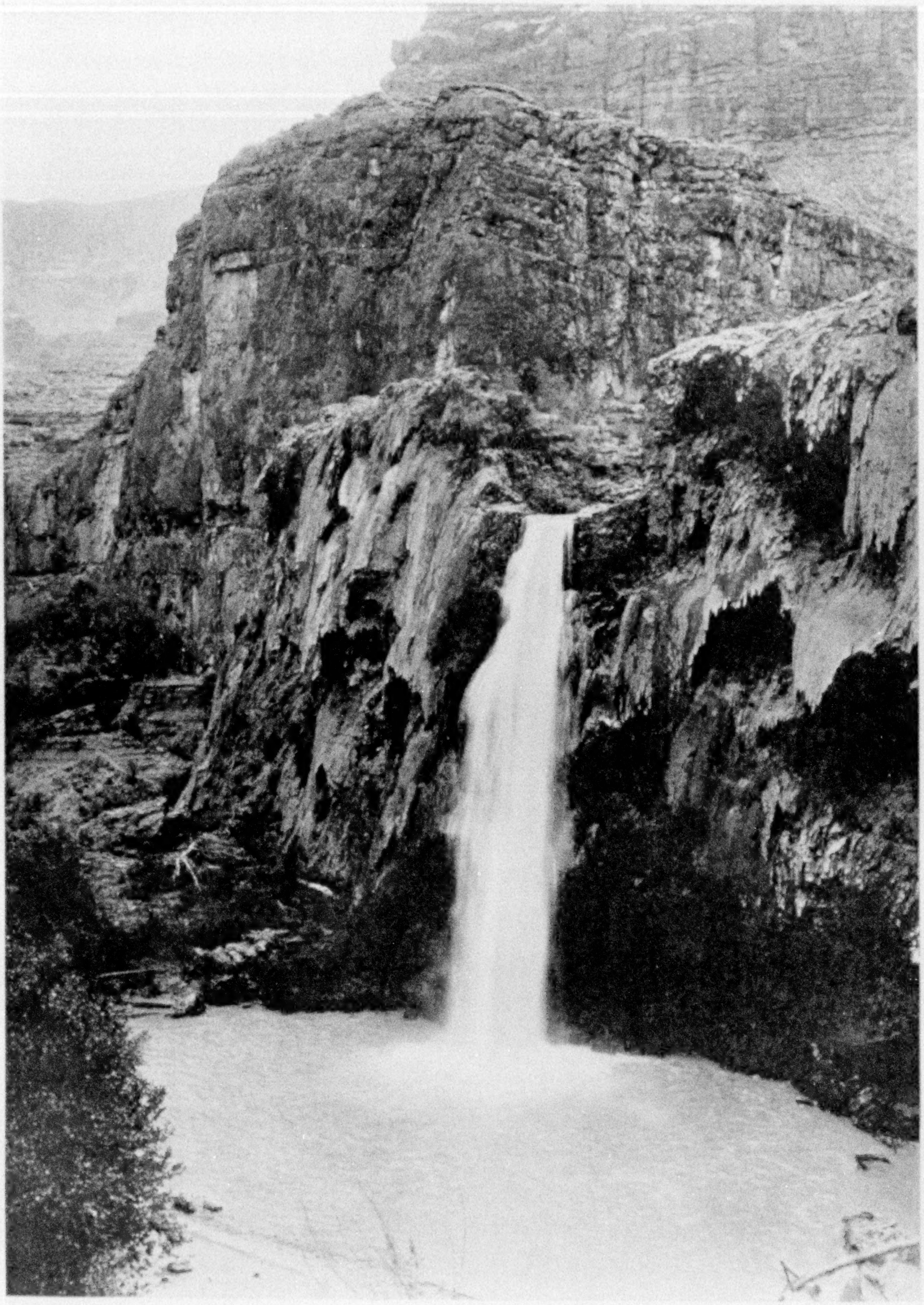
The boat drove through the next couple of waves bow on and then slid away from the heavy rollers under good control. Pulling across the current of the tail of the rapid, I beached the boat on the left bank, to find that it had suffered no damage from the collision.

The *Grand* had the driest run through of any of the boats; nevertheless getting in where I did at the head was not creditable, even in the face of a sandstorm.

CAMPING ON A STEEP TERRACE

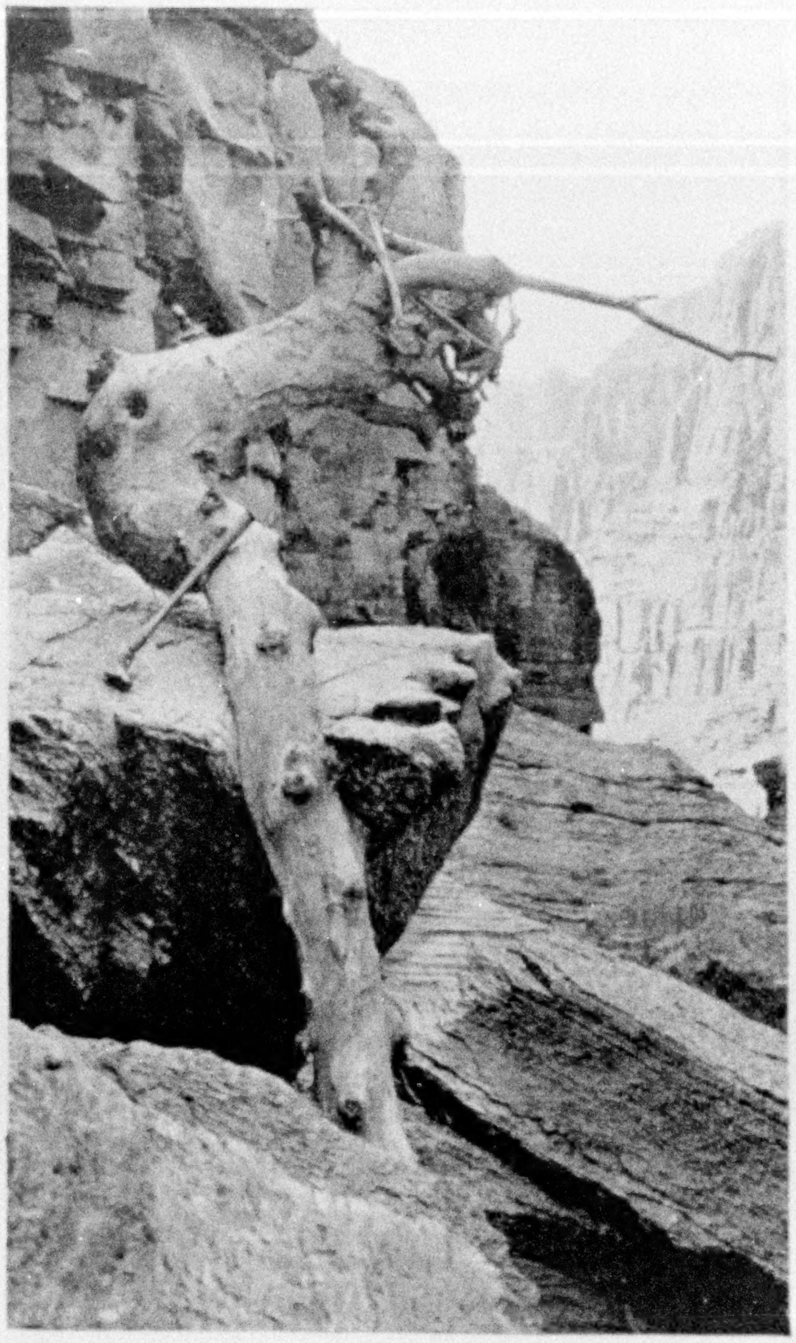
Camp was pitched on a steeply sloping terrace of rocks and sand at the head of a big back-sweeping eddy. The sand was bound and held in place by the roots of salt grass, very fresh and green in appearance. Room for our beds had to be cut with the spade out of the silt and sand. The bank from which mine was sliced had a 60-degree slope to the river.

Moore lay feet-to-feet with me, while the Chief kicked sand impartially on both



A WATERFALL IN HAVASU CANYON: GRAND CANYON NATIONAL PARK

In this deep gorge are several of the most beautiful falls in the world. Their number and beauty led the explorers who first saw them to call the gorge Cataract Canyon, a name by which it is still known upon some maps, but which is officially used now to designate the stretch of the Colorado above Marble Canyon.



Photograph by E. C. La Rue

"WHERE WOOD CUTS STONE"

A willow log six inches in diameter has eaten into a hard limestone boulder, four miles below the mouth of Havasu Creek. The log was not worn, which demonstrates that the water acts as a cushion, protecting the wood, while the silt in the water does the cutting.

of us from his niche above. Radio came in as clearly as ever, in spite of the fact that the rim of the Kaibab now towered more than 2,000 feet above us. There was a Sunday evening concert of real quality over KHJ; also an announcement that the date of President Harding's funeral had been fixed for the 10th.

From a boating standpoint, August 6 was one of the liveliest days of the voyage. Three or four major rapids and a number of riffles were run, in nearly every instance the head of one being in sight from the foot of the preceding. The total distance made was three miles, with a descent of 50 feet. This stretch has probably the heaviest average fall in Marble Canyon.

As the *Grand* approached the second rapid with Moore and La Rue riding, Kolb, who had landed to look it over, signaled me that it was all right to go on through. It was a straight run down the middle, with no chance of hitting rocks—only big water.

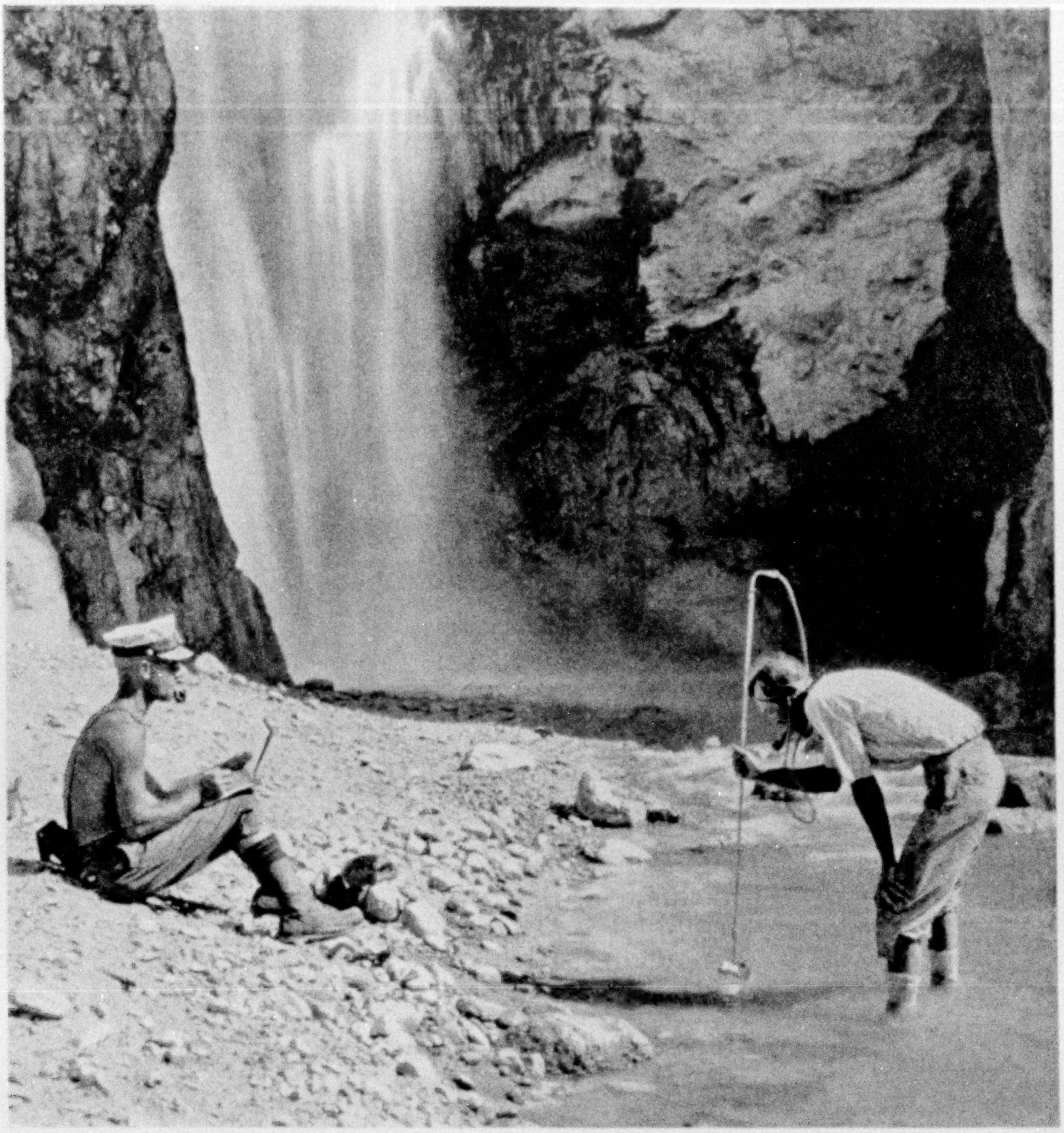
The opportunity to see what the boat would do in really heavy waves, where there was no chance of banging it up, was too good to miss. Sooner or later it would be swamped, anyhow, I told myself, and it would be a good plan to find out what weight of water would do it. Unfortunately, I was so confident of riding this particular chute without filling that I did not take the precaution of putting my camera under cover.

SWEPT BY WAVE AFTER WAVE

The middle V rolled over smooth and solid, like the brink of a real cataract, and it was not until we were almost at the upflung comber at the bottom of it that I had an inkling of what we were in for. The *Grand* had an easy rise to the first wave, and went through it without tearing more than a bucketful off the top.

The next was a sidewinder from the right, however, and came banging over the quarter savage and solid. La Rue's writhing anatomy stopped a lot of it, but enough rolled on to fill the cockpit up to the seat. A third wave completed the job and left the gunwales awash. We barged down the rest of the rapid after the fashion of a raft, with wave after wave sweeping us fore and aft.

As the water was warm, there was no particular discomfort. The boat rolled much worse than normally, dipping a gunwale under at every roll; but she was still responsive to the oars and I had no trouble in bringing her into an eddy and



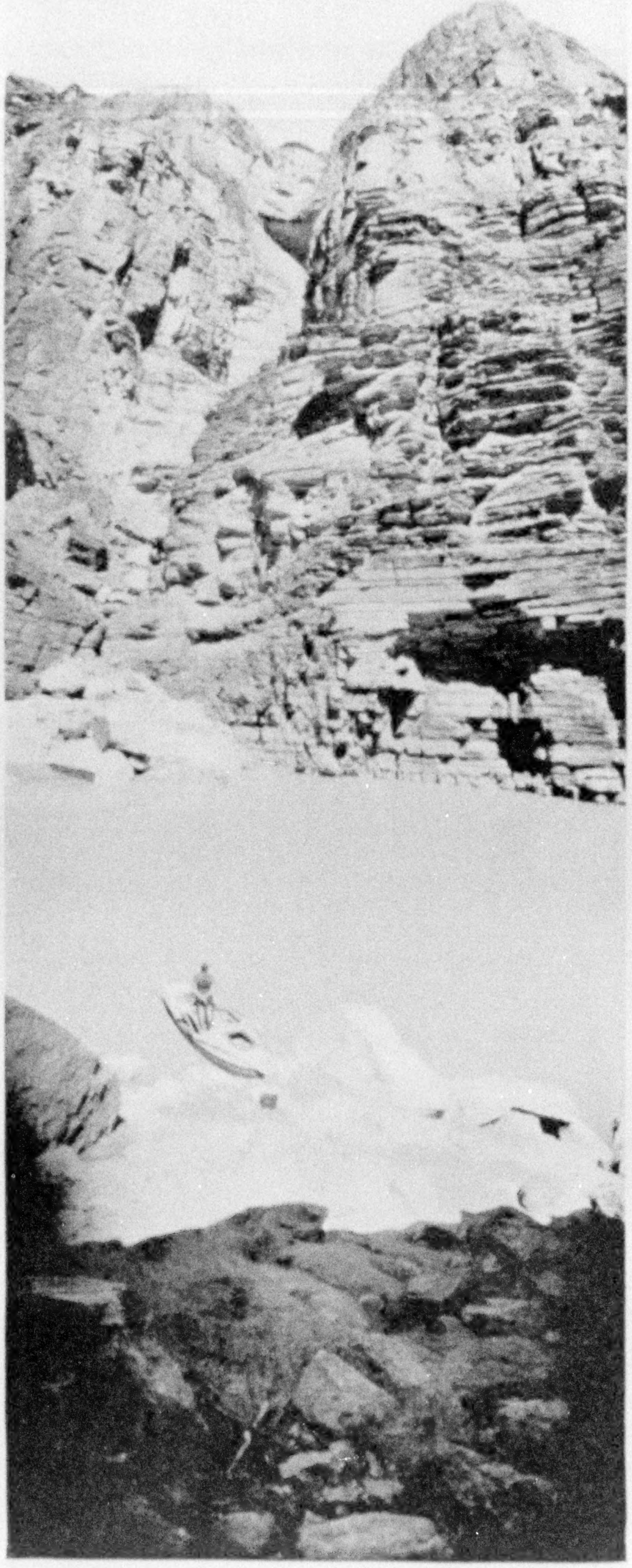
Photograph by Lewis R. Freeman

LA RUE, WITH A CURRENT METER, MEASURES THE FLOW OF A SIDE STREAM

up to the left bank well above the head of the next rapid. After ten minutes of baling, the cockpit was dry again. The water-tight box under the seat in which some of our cameras were kept was as good as its name.

The small camera, which had sloshed around the cockpit for a couple of minutes, was soaked and the film spoiled. Except for that, the experience was a valuable one in giving a line on the boat's capabilities in heavy water. Plainly, a swamping was a matter of no serious moment, provided there were no bad rocks below. To me the incident was distinctly reassuring, though it took some argument to bring my saturated passenger on the after hatch round to the same way of thinking.

The other three boats, with one passenger each, made the run through the rapid without incident, but Dodge, with the canvas boat, capsized in the first wave, dropping out of sight for two or three seconds. Bobbing up again farther down, he appeared to be holding to the overturned boat and working it toward an eddy along the right bank. Lint and I pulled across to him, but he had the canoe against the rocks and was trying to right



Photograph by E. C. La Rue

THE GRAND CANYON ONE AND A HALF MILES ABOVE HAVASU CREEK

This is near the west boundary of the Grand Canyon National Park. Note the "face" in the notch of the canyon wall.

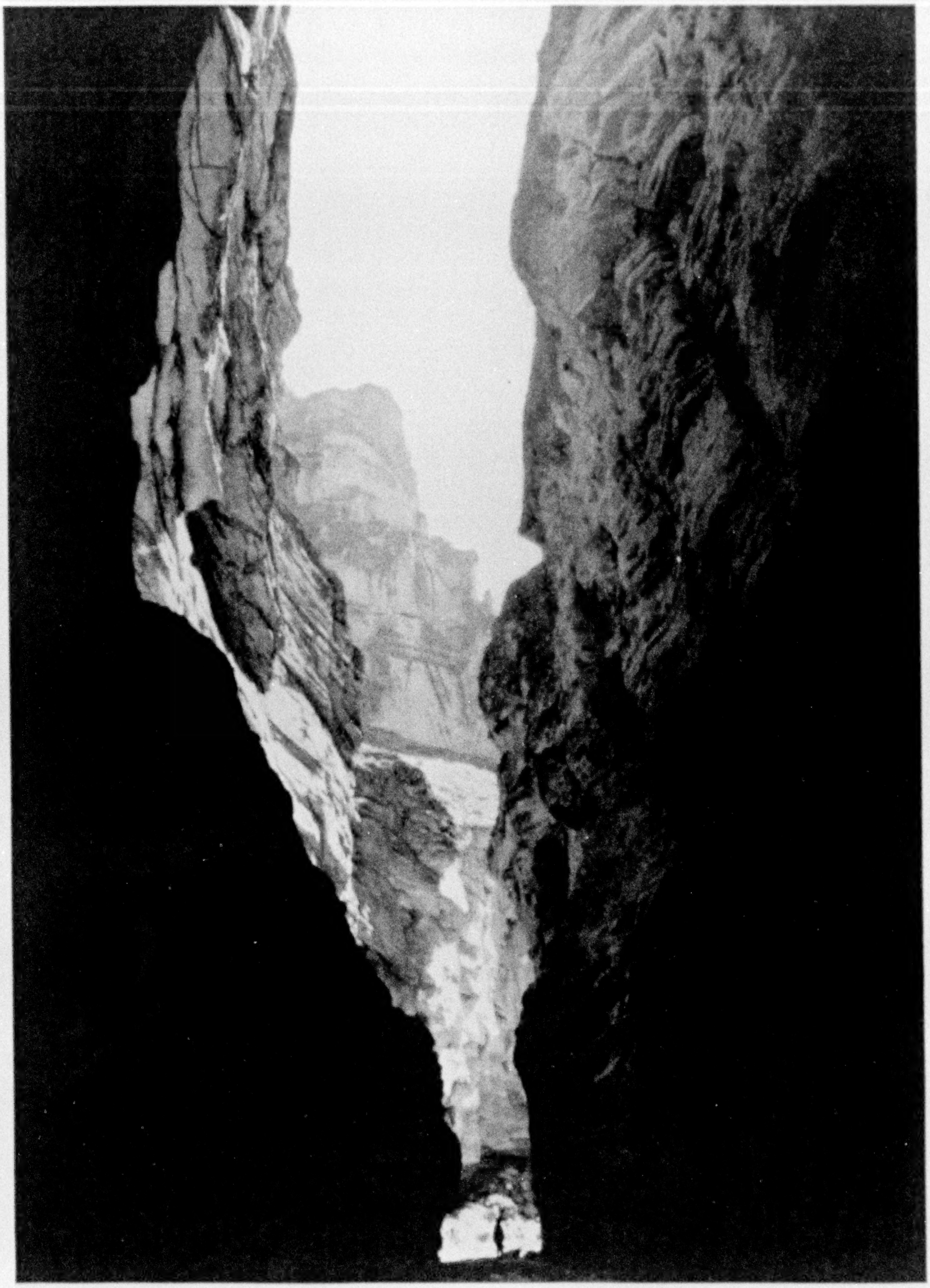
it before we arrived. It was a hard place in which to work on account of the packed driftwood, but a few minutes sufficed to have the *Mojave* in commission again. To Dodge, who was born in Hawaii and half raised in the water, the upset was no more of an incident than his morning bath.

Drifting past an undercut cliff, I noticed for the first time the water-polished limestone which had led Powell to apply the name of Marble Canyon to the gorge which is properly the upper end of the Grand Canyon. This is not a real marble, according to Moore, but it is very hard, takes a beautiful finish, and would undoubtedly make a fine building stone. I passed within oar-length of some brilliant outcroppings of rock crystals, and at one point about 40 feet above the water was the mouth of a cave of considerable depth.

A TRAPPER'S OUTFIT FOUND IN A CAVE

We ran on to a camp at the head of an abrupt and noisy rapid, where the seepage from a steep canyon formed a number of clear springs, while a rising series of hard sand terraces gave good sleeping room. Climbing over the rocks to look at the rapid, we found a trapper's complete outfit half buried in the sand of the floor of a large cave. Traps, cooking utensils, brace and bits, saw, files, awls, coffee mill, and a number of other things were listed and laid out for a photograph (see page 486). The only article of wearing apparel was a rubber boot.

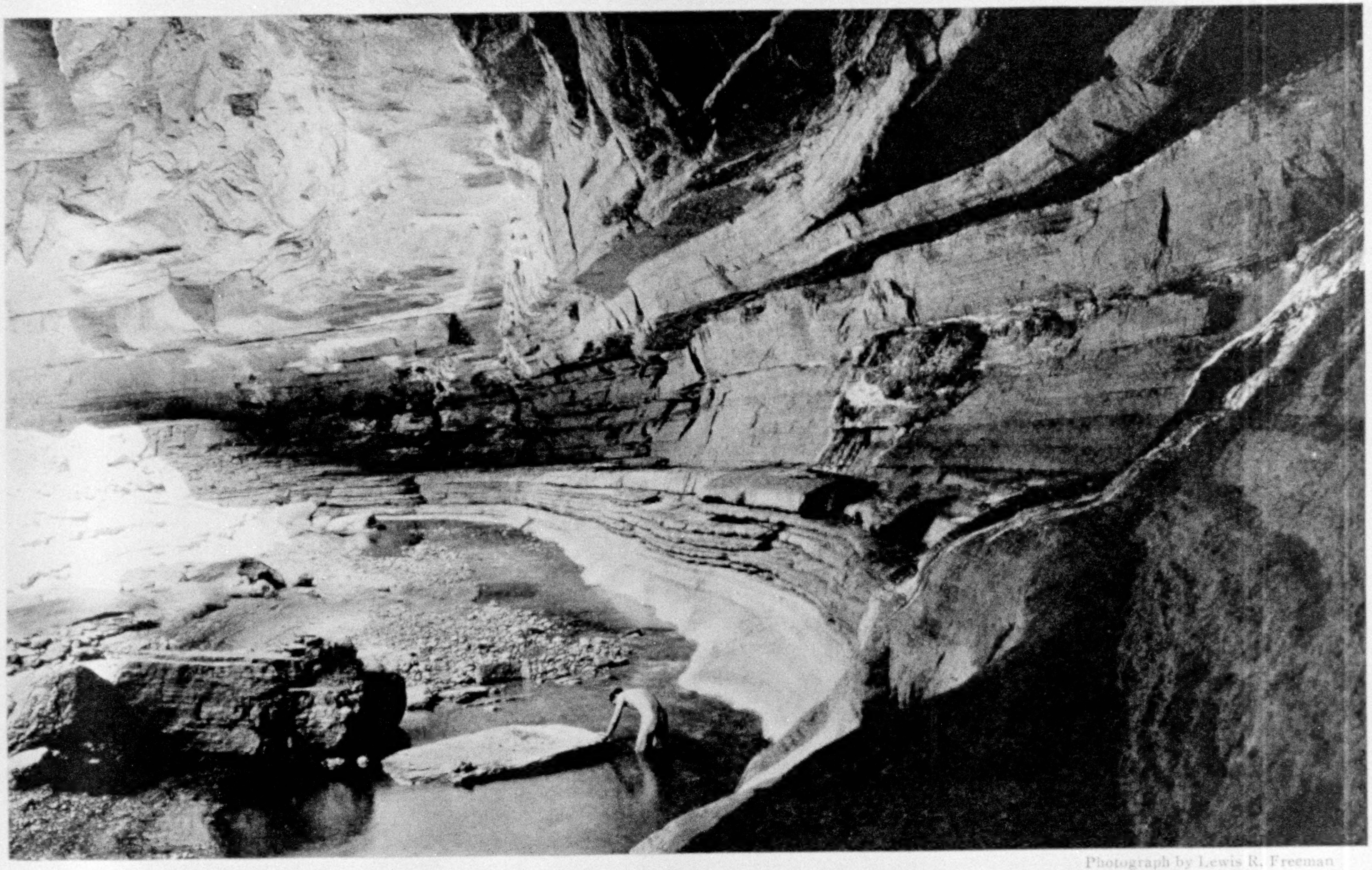
As the cave was below high watermark, it appeared probable that all of the lighter objects had been carried away. We could only conjecture as to the fate of the trapper or trappers. As there is no record of any such party reaching or passing Bright Angel,



Photograph by E. C. La Rue

LOOKING DOWN FERN GLEN CANYON

This canyon joins the Grand Canyon on the right bank, 11 miles below the mouth of Havasu Creek.



Photograph by Lewis R. Freeman

BATHING IN KANAB CREEK

The end-of-the-day plunge was a regular feature of the party's program for many weeks The water was usually red with mud, but it was "a clean sort of mud" and came off readily under vigorous toweling.

it seemed practically certain that the owner or owners were lost, with their boat, in the rapids below. Indeed, we had a graphic illustration of what may have happened to the trappers' boat while preparing to run the following morning what it had been decided to call "Cave Rapid."

Burchard, Dodge, and Kolb were just starting to line the canvas boat down the right side of the rapid, to have it available below in case of emergency, when, the painter being slacked too quickly, the little craft carried over a rock, filled, and was smashed into a shapeless mass.

An hour's work by the whole party salvaged only one oarlock and some kindling wood from the *Mojave*. We were unable to drag the canvas skin from where the current had wrapped it round a boulder. The little boat had been very useful, but was far from indispensable; its early loss, moreover, had been anticipated (see illustration, page 487).

Dodge and the rod henceforth rode on the *Glen*, while the cook was shifted to the *Marble*.

The four boats ran Cave Rapid without passengers.

We had a pleasant camp that night on a beach between two winding rapids, with the seep from a canyon supplying good drinking water again. Burchard, after completing his surveying, stated that he was inclined to the belief that this camp was in the vicinity of Stanton's Point Retreat, and that the canyon behind it was the one by which he had left the river after the culminating disaster had resulted in the drowning of two members of the Brown party of 1889.

Running several easy riffles, we came, just before noon the next day, to one which disappeared around a bend and was divided by the first midstream boulder bar we had encountered. A brilliant patch of verdure against the side of an amphitheater at the right of the bend recalled the leafy bowers of Glen Canyon. A hundred feet farther down the side another patch of green, shot with gushing jets of clear water, revealed the place as Vasey's Paradise, named by Powell after a botanist associate (see illustration, page 492).

The cliffs below Vasey's Paradise are unrivaled in the whole Grand Canyon series, save possibly by those in the vicinity of the mouth of Havasu Creek. Delicately rather than brilliantly colored, their subdued pinks and yellows and browns throw back to the depths of the gorge a mellow blend of lilac, pearl, and amethyst that has almost the palpable fluency of poured wine.

CANYON WALLS UNRIVALED IN COLOR

Plummets of sunlight alchemized frequent wedges of swirling water to arrowheads of liquid gold, with saffron-bright motes weaving in a saraband on the wall above in the dusky purple shadows of a cave mouth. Quiet, smooth-flowing water gave us opportunity to revel in the veritable symphony of colors undisturbed by navigational worries.

We found cold springs spouting out of the rock at a number of points. Some of the most ambitious of these had built themselves little turreted houses from the mineral salts carried in solution—real miniature shower-baths, with the glint of falling water and the rattle of spray always in evidence as we drifted down past their mist-curtained windows.

Grass and flowers were lush and green within spattering range of the flying drops, and it was no end of a delight to drop in from the scorching sunshine of mid-river, to lounge for a few minutes and perhaps strip for a hasty bath in clear water. When one wears only half a pair of pants, or thereabouts, taking a bath is not a matter of extended preparation.

Farther along this same stretch of canyon we came to a fantastic jumble of windows, gables, turrets, and buttresses for which the name of "Goblins' Castle" would be highly appropriate. It had one small hole looking out to the sky through its cliffy roof, and about midday this must let a beam of sunlight through to dance upon the waves of the riffle that is trying to undermine the limestone foundations of the crazy pile.

Toward the end of the afternoon we landed to explore a large undercut cave or amphitheater beneath the left-hand cliff. The roof rose steadily until it overhung the middle of the river at a height of 200 feet. The floor was a succession of terraces of hard, smooth sand, rising like the seats of a stadium until the

Photograph by E. C. La Rue

EAT, NOT SWAT, THE FLY

This pet lizard, in the cabin of the Geological Survey engineer who measures the discharge of the Colorado at Bright Angel (see illustration, page 500), keeps the insects busy.

highest touched the vault of the limestone roof. Powell was in error in locating this cave above rather than below Vasey's Paradise and his estimate of a seating capacity of 50,000 was liberal (page 483).

THE FIRST DEER ENCOUNTERED

On the 9th we passed the first mesquite trees and sighted the first deer. We tried to corner the latter on a talus for the movie camera, but they were too shifty to make close-ups possible. A doe escaped by swimming the river, part of the distance through a fairly swift riffle.

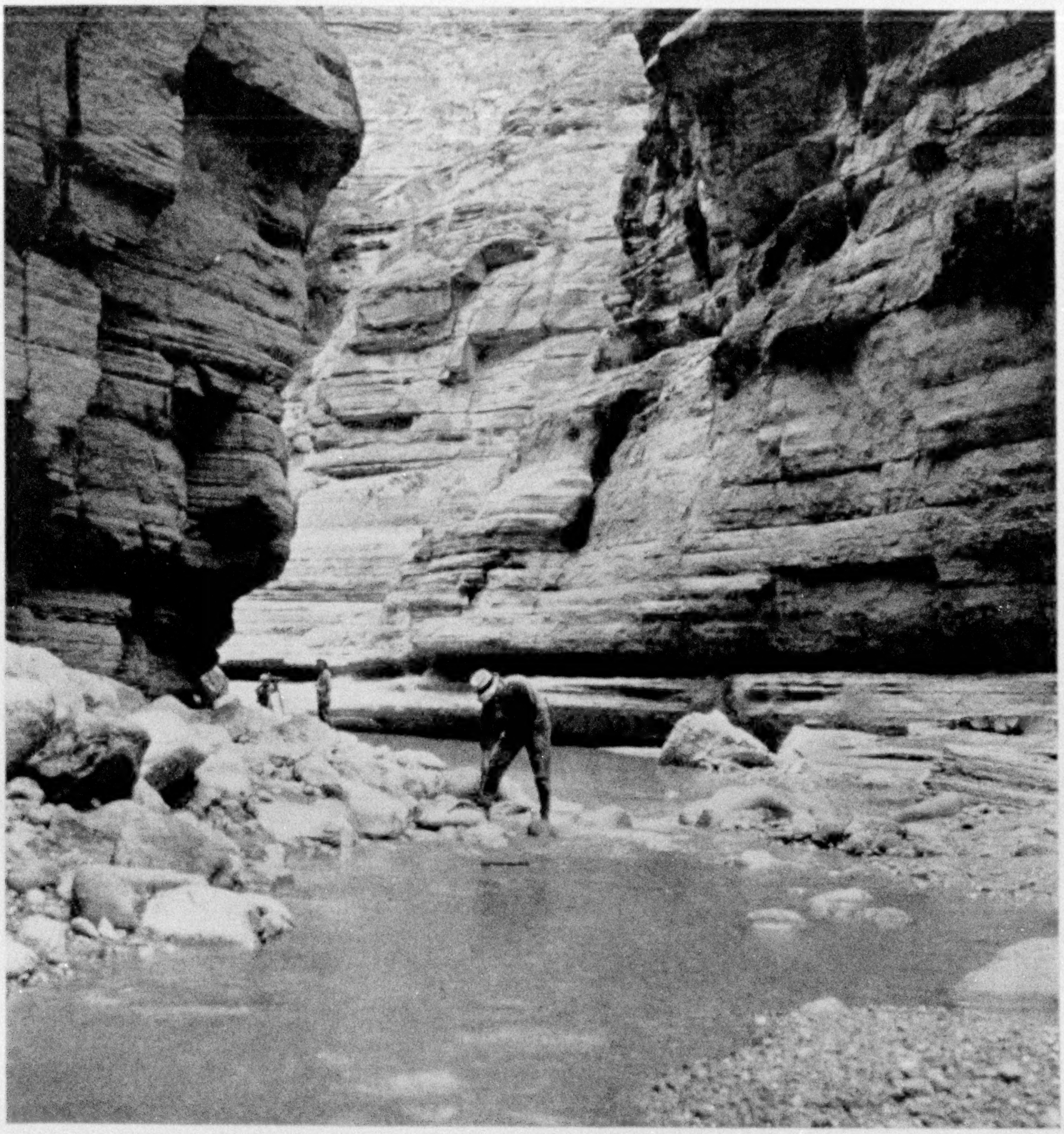
A huge boulder planted squarely in the middle of a short but savage rapid halted us early in the afternoon at a bend which was identified beyond a doubt as Stanton's "Point Hausbrough." As the obstruction ahead plainly needed careful study before passing and as the 10th had been set aside for observance of the memory of the late President, a two-day camp was made on the sandbar opposite the historic landmark (see illustration, page 493).

VIOLENT STORMS

A series of terrific wind squalls swept the river just after we landed, at the height of which water was blown far up the beach where we had begun to pitch camp. The cliffs were masked with clouds of blown sand, and the foam above the water thrown back from the great midstream boulder was carried high up against the leeward walls. Black, swollen thunderheads began gathering in the wake of the squalls and the main storm broke just as supper was over.

There was a lively scramble to keep beds from blowing away. After the wind the rain set in, first in violent squalls, then in a steady downpour. No shelters had been set up. Some of us swathed ourselves in pieces of canvas; others crawled into sleeping-bags and covered up; two crept into the emptied holds of the boats. Probably the best solution was hit upon by those who stacked their stuff under tarpaulins and cavorted about in the warm rain *au naturel.*

Violent storms of this character continued to sweep our camps at frequent intervals until about the middle of September, when the cooler weather of early fall put an end to the seasonal disturbances.



Photograph by Lewis R. Freeman

IN KANAB CANYON—1,800-FOOT LEVEL

Between Kanab Canyon and Havasu Creek the expedition encountered a hitherto-unnamed rapid. In commemoration of the first upset of the trip (in which neither boatman nor boat was injured), it was christened "Upset Rapid" (see text, page 524).

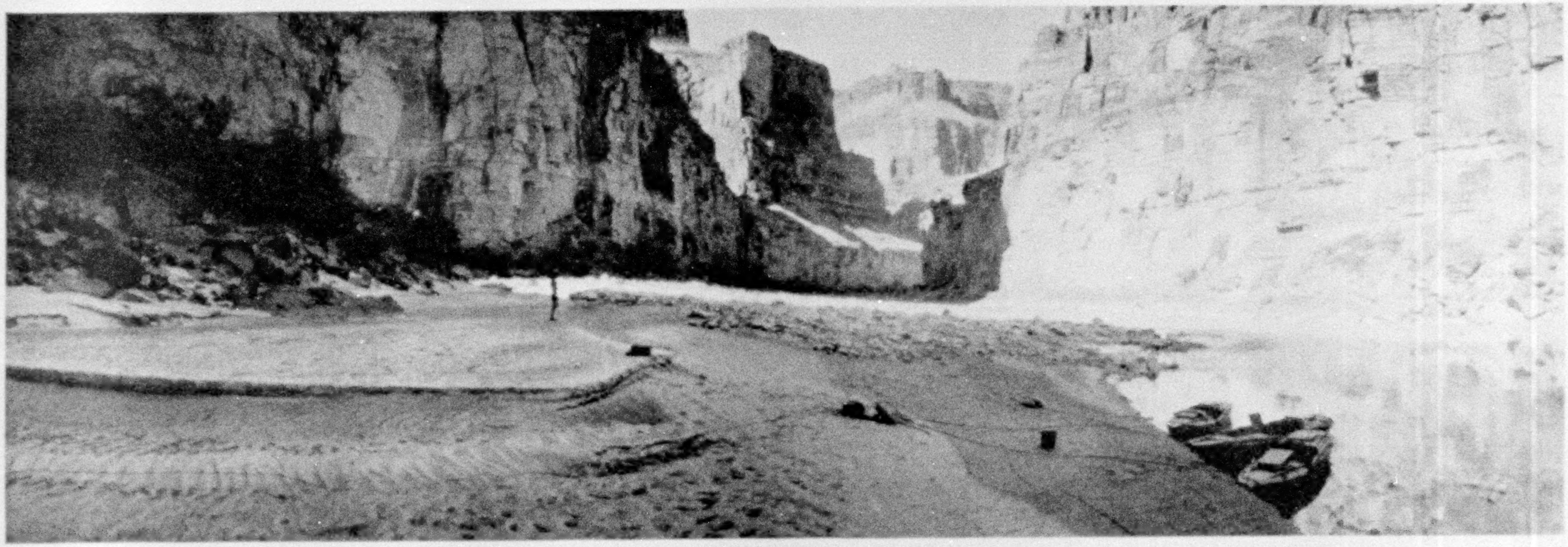
Of the burial of Peter Hausbrough, drowned about ten miles above, Stanton wrote:

"We stood around the grave while one short prayer was offered, and we left him with a shaft of pure marble for his headstone, 700 feet high, with his name cut upon the base; and in honor of his memory we named a magnificent point opposite Point Hausbrough."

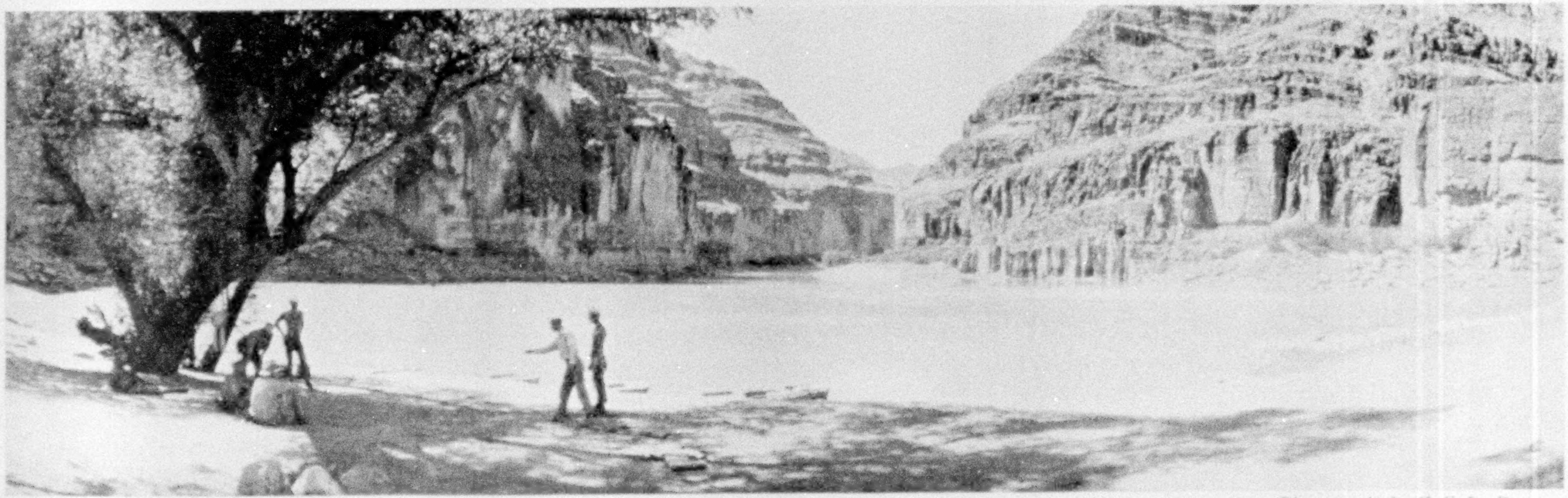
Although the grave must have been immediately behind our camp, careful search failed to reveal it, doubtless because the talus at the foot of the cliff had been built up a number of feet in the third of a century which had elapsed since the inscription was carved.

The rock-obstructed rapid which we encountered below this camp is evidently of recent formation. No mention of it is made in the records of any of the earlier voyageurs, and Kolb said he had no recollection of it from his passage of but little more than a decade ago. There appeared to have been a straight, steep chute here in the first place, and this had been

XUM

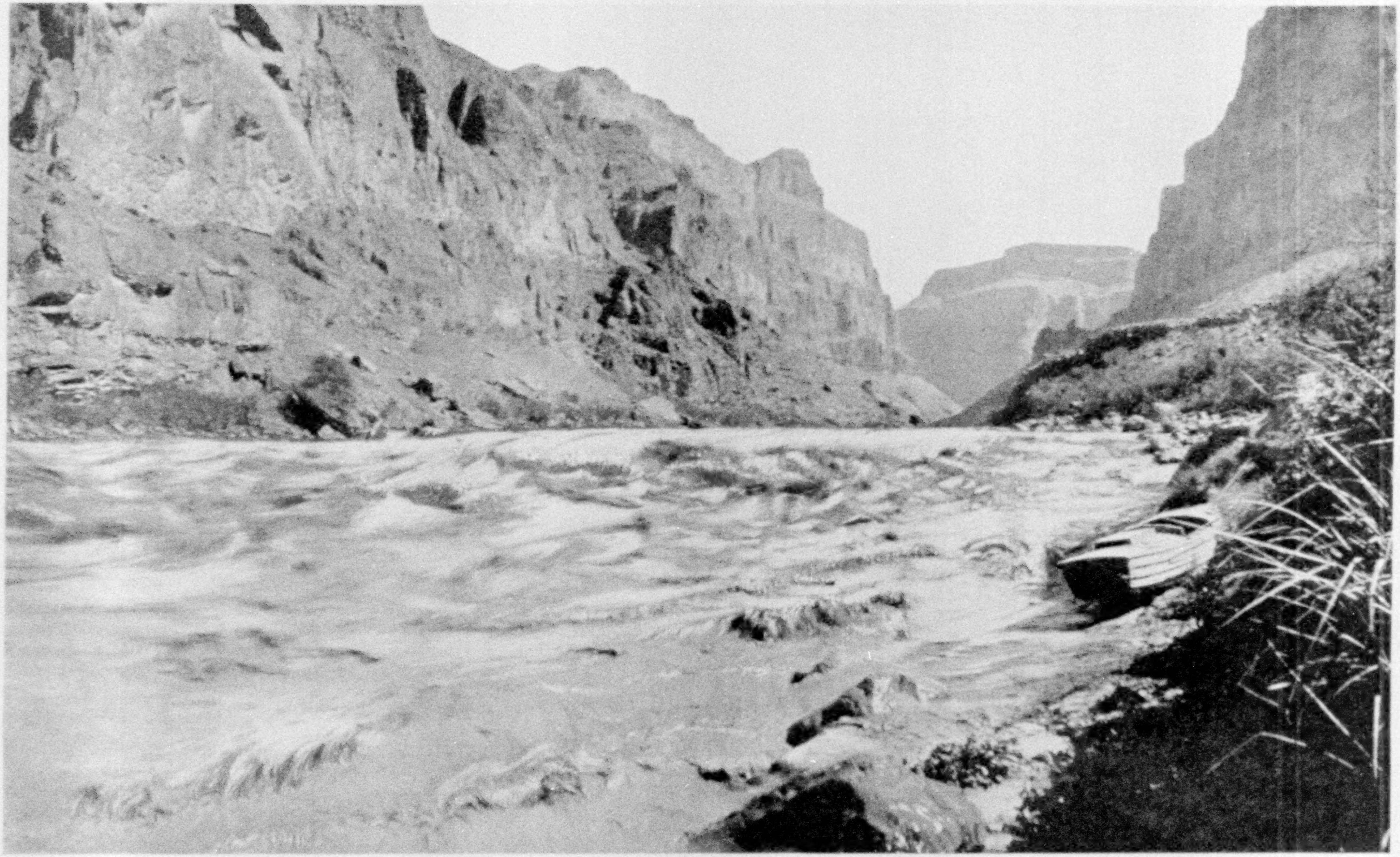


DOWNSTREAM VIEW OF THE GRAND CANYON 2.6 MILES BELOW HAVASU CREEK. THE CANYON OF CATARACT CREEK ENTERS AT THE LEFT



Photographs by E. C. La Rue

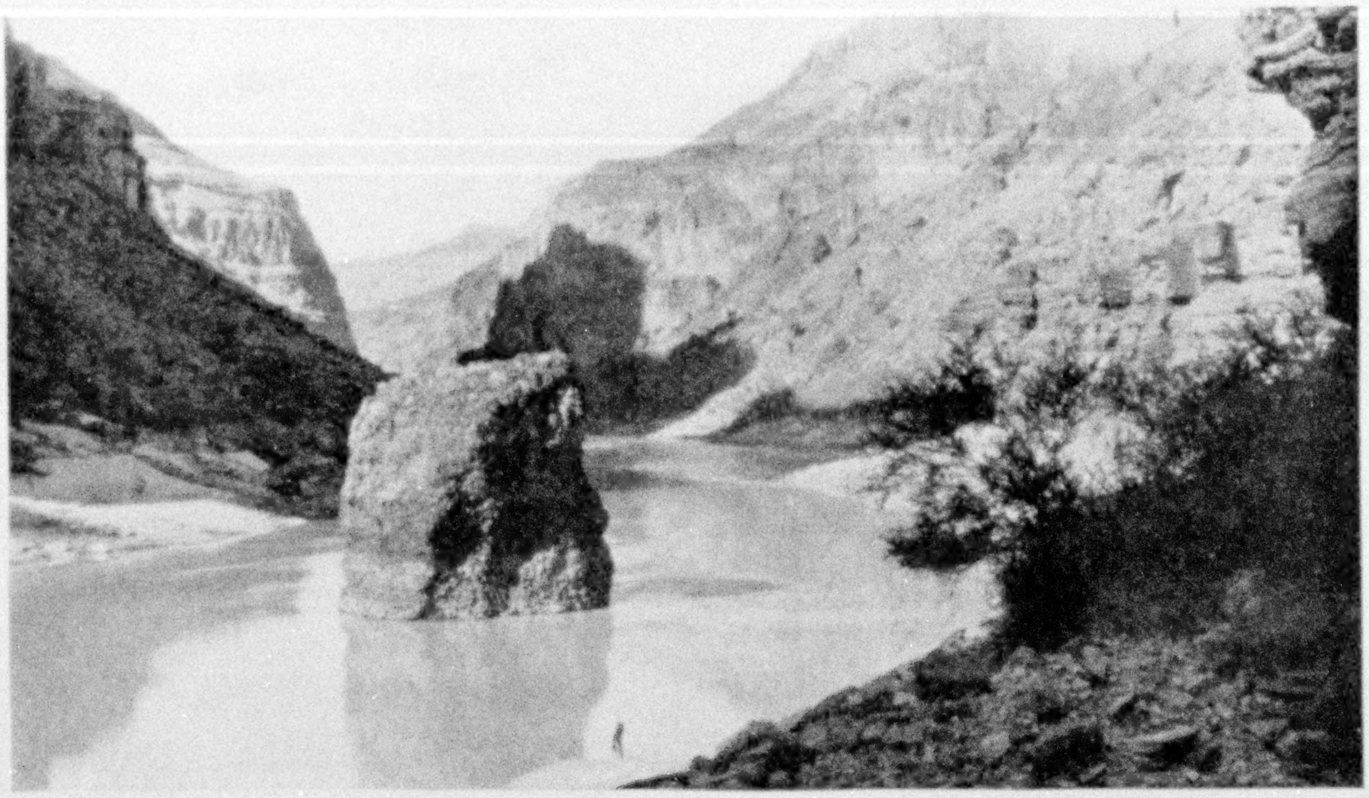
THE MEN AT PLAY 40 MILES BELOW THE MOUTH OF HAVASU CREEK, WHILE WAITING FOR THE ENGINEERS TO COMPLETE A SIDE CANYON SURVEY



Photograph by E. C. La Rue

THE FLOOD AT LAVA FALLS (SEE TEXT, PAGES 524-5)

Unwarned, the party was taken unawares at a point far from favorable—twilight on the brink of the falls.



Photograph by E. C. Kolb

LAVA ROCK ISLAND, ABOVE LAVA FALLS

Lava Falls are three and a half days' journey below Havasu Creek (see also text, page 524, and illustration, page 517). The man in the foreground provides the scale.

dammed by a great slide from the right-hand wall—Point Hausbrough. Immediately after the slide the obstruction must have extended from bank to bank, doubtless backing up the water for a considerable distance upstream. Then this broke and carried down the looser débris, leaving only the huge block of limestone planted squarely in the middle of a fierce tumble of broken water.

BOATMAN HURDLES THROUGH THE AIR

Above the rock was a back-thrown wave of water more than 10 feet in height; below it a whirlpool with a depression half as deep as the comber was high. On account of the throw-off of the wave, an actual collision with the rock itself was improbable, if not impossible; the danger was in an upset which would allow the overturned boat and its boatman to be drawn into the whirlpool below, where an uncomfortably rough and protracted stay could hardly be avoided.

After studying the rapid from every angle during our rest day, it was decided to run the right-hand channel. The downrushing chute appeared to divide almost equally upon the great rock, but there seemed to be a shade greater concentration of current on the side toward Point Hausbrough. We pulled all four boats up the eddy, crossed over, and tied up on the right bank 200 yards above the head of the rapid. Kolb ran bow first, getting as much way on as possible, shooting down the right side of the V and continuing to pull away from the back-curling wave thrown off by the rock. His boat had a hard slap, as did the *Boulder*, which followed, but neither was near to serious trouble.

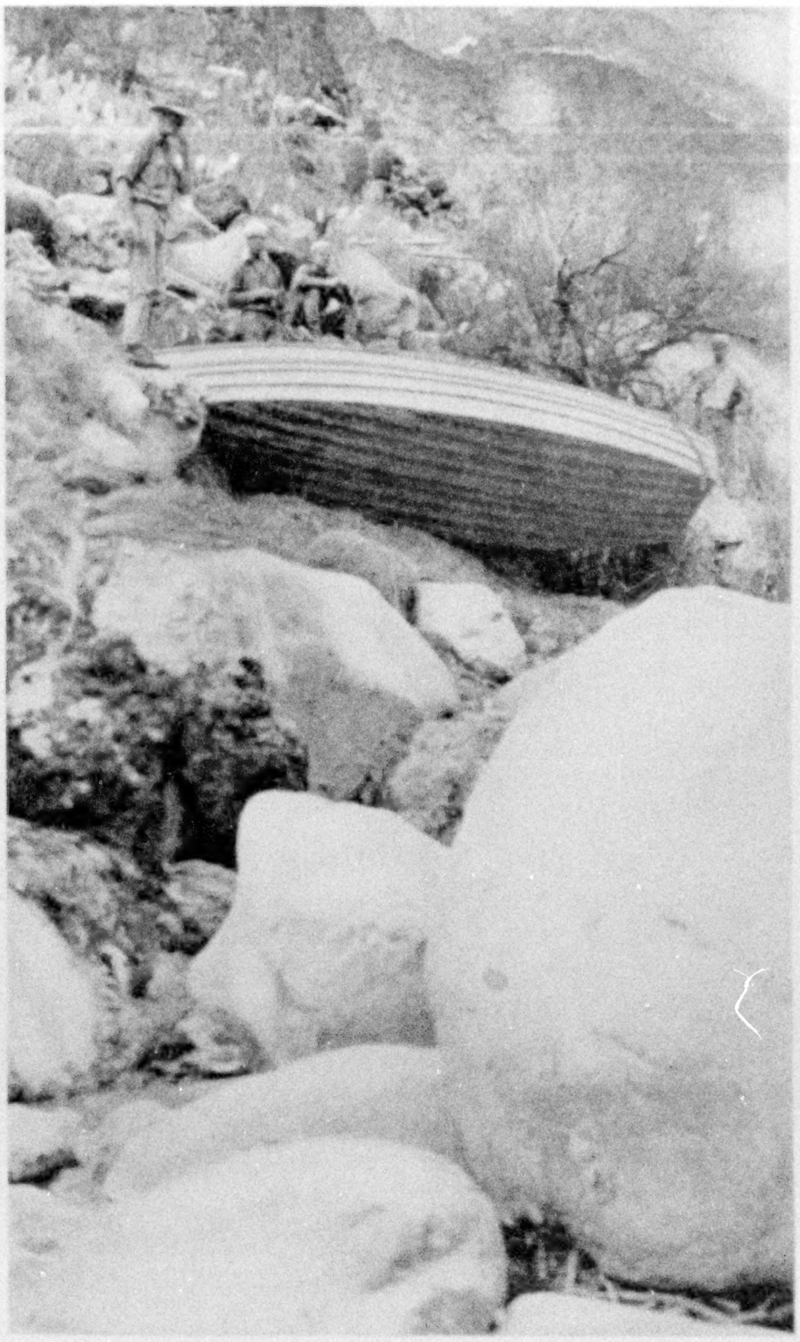
Blake, running next, evidently failed to get far enough to the right. The *Glen* was driven down against the back-thrown wave side-on, and missed capsizing by a hair. Looking back from above the rapid where I was about to push off with the *Grand*, I saw all the bottom boards of the boat as it was flung on its side; then the flick of a flying oar and the sprawling body of a man silhouetted against the cliff below, as it hurtled through the air. An instant later all had disappeared, and I had to run through myself to learn what had happened.

I eased pulling a bit sooner than was desirable, after dropping over the brink of the chute, and so came in for a harder slap from the wave than there was occasion for. The blow was scarcely less solid than that from actually striking a rock, and the geyser of tumbling water inflicting it looked even less friendly rearing up above my head than when seen from the bank.

My heavily loaded boat righted quickly, however, and shipped very little water. As it shot past the rock I caught a fleeting glimpse of the hole below out of the tail of my eye. That was another little corner that did not improve with closer acquaintance, especially with the whirlpool showing off what it could do by bumping a captive log of driftwood up against the rock. The cat-and-mouse game looked as if it might have been going on a long time.

The maelstrom seemed to be "whoufing" with glee, as if it could keep up its end of the sport indefinitely, and until it relaxed its hold the only chance the log appeared to have of escaping was through being battered to bits against the boulder. I was glad to pass the outer tips of the indrawing tentacles of the octopus by a comfortable oar's length.

I found the *Glen* right side up in an eddy, with its boatman bailing the cockpit. He confirmed the impression I had received from above: that the force of the blow on the side of the boat had flung him over the gunwale without touching it. Unhurt, he had climbed back aboard after his boat had cleared the whirlpool, replaced a lost oar, and pulled into quiet water.



Photograph by E. C. La Rue

SAVED FROM THE FLOOD

The *Marble,* drawn up 21 feet above the river after the high waters of September 18 had receded (see text, page 530).

Three days more of boating took us to and past the mouth of the Little Colorado, which showed signs of having been in flood and was still flowing an unseasonably high stream of vile-smelling mud.

The main stream was never quite as pleasant bathing after receiving this sewerlike discharge, the rank, offensive smell of which we were destined to experience on one or two later occasions.

The survey showed the length of Marble Canyon to be slightly more than 61 miles, and the elevation of the mouth of the Little Colorado as 2,718 feet. Dellenbaugh had estimated Marble Canyon to be 65 miles long. This discrepancy is not great, considering the conditions under which the Powell expeditions made their calculations.

ENTERING GRAND CANYON NATIONAL PARK

There was nothing at the mouth of the Little Colorado resembling the great whirlpool located there by James White in his lurid account of a raft voyage through the Grand Canyon in 1867, two years before Powell.

Nine miles above the mouth of the Lit-

Photograph by E. C. La Rue

ALL THE COMFORTS OF THE CANYON

Moore enjoying life while activities are suspended for three days, until the flood waters subside (see text, page 530).

tle Colorado we entered the Grand Canyon National Park. As the several sheets covering the course of the Colorado through the National Park are rated as perhaps the finest examples of topographical mapping in existence,* the work of the river party was greatly simplified for most of the next 100 miles.

There was no longer need to survey side canyons, while the amount of topographical work on the main river was materially reduced. This left the carrying of the river line as the principal work of the topographic engineers of the expedition, greatly accelerating our rate of progress.

Where three or four miles was a good average day's work in Marble Canyon, from five to ten could be covered through the National Park. We were usually three or four days ahead of schedule all the way from the Little Colorado to the mouth of Havasu Creek.

There is swift water and a heavy fall to the river all the way from the mouth of the Little Colorado to the head of the Granite Gorge, but only three or four major rapids. The last of these is the Hance, at the foot of the trail of that name.

We had lively boating in a storm-swollen river all the way down this 15-mile stretch, but no serious mishaps, and reached the foot of the old and long-disused Hance Trail in the forenoon of the 16th, four days ahead of the time our pack-train had been ordered to come down with fresh supplies. In the interval we sent out to El Tovar for new and stronger oarlocks in anticipation of rough work in the Granite Gorge below.

RUNNING THE DANGEROUS HANCE RAPID

As far as our records showed, no previous party had run all of its boats through the Hance Rapid with its 28-foot fall in the upper section. The portage being a long one and conditions for lining down the side almost impossible at the present stage, running seemed worth trying, especially as the mules of the pack-train were available to carry our loads down.

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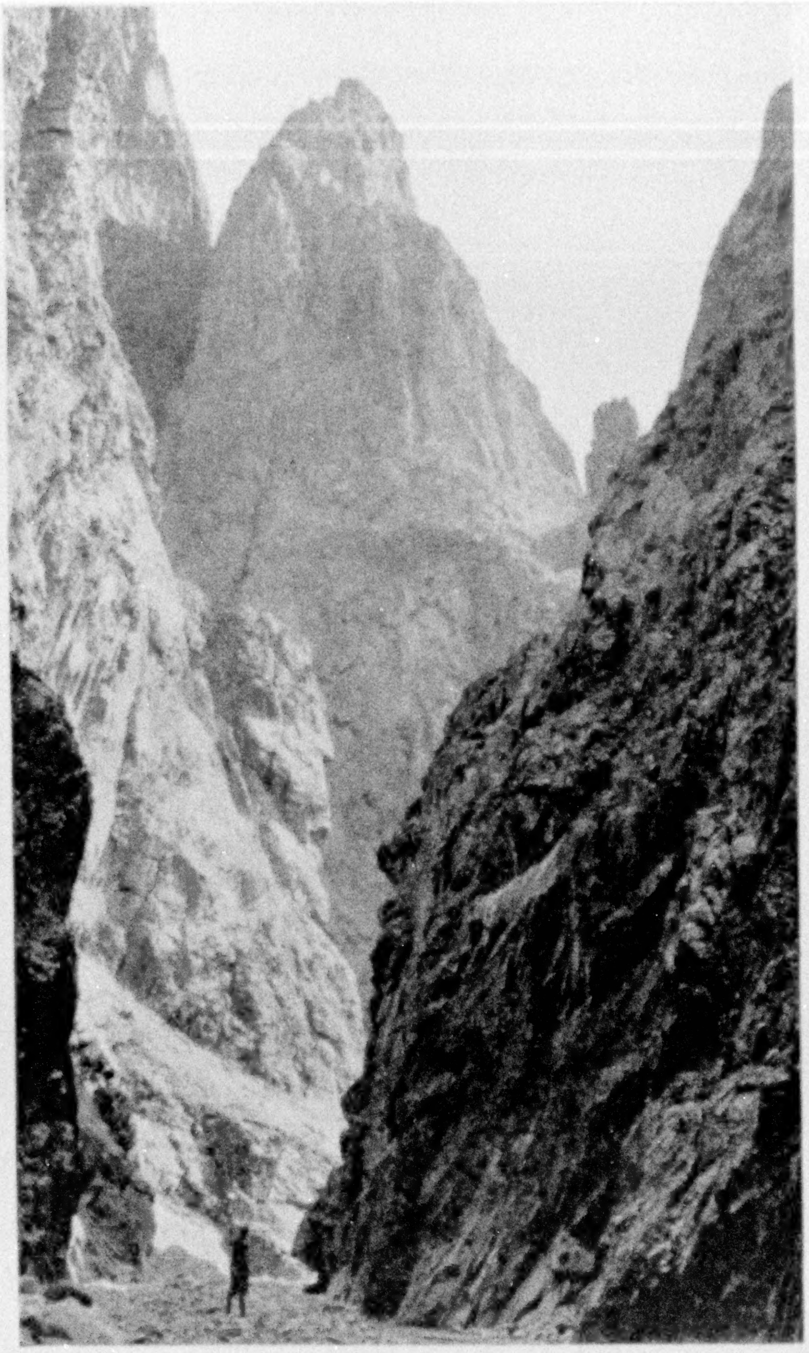
* The Vishnu, Bright Angel, and Shinumo sheets of the Geological Survey represent many years' work by François Matthes and Richard T. Evans, topographic engineers. They are considered equal, if not superior, to the finest work of Swiss, French, and Italian topographers in mapping the Alps.

The decision was justified. The emptying of the holds of the boats made an unbelievable difference, not only in their responsiveness to the oars, but also in their ability to ride over waves which would otherwise have buried them. It was a fine sporting run.

After a day spent in going over our boats, we pushed off again on the morning of August 21. A light drizzle of rain was falling as we entered Granite Gorge, but even with that the walls had a less sinister aspect than one expected after Powell's description.

OVER THE FAMOUS SOCKDOLOGER

An impression of that kind is largely psychological, no doubt. Powell, with dwindling, half-spoiled supplies and battered boats, was facing both starvation and the Unknown; we, with a fully equipped outfit, were pushing on for the foot of the Bright Angel Trail with the prospect of a three-day rest at the hotel on the rim. No wonder we had eyes for the gleaming brightness of quartz, feldspar and mica where the pioneer explorer saw only the forbidding loom of dark walls of igneous rock.



Photograph by E. C. La Rue

LOOKING UP DIAMOND CREEK GORGE FROM A POINT THREE MILES FROM THE RIVER

A mile in heavy swirling water took us to the head of the Sockdologer Rapid. Landing 200 yards above the first drop, we climbed down along the right-hand wall to the nearest point attainable to the brink of the opening drop.

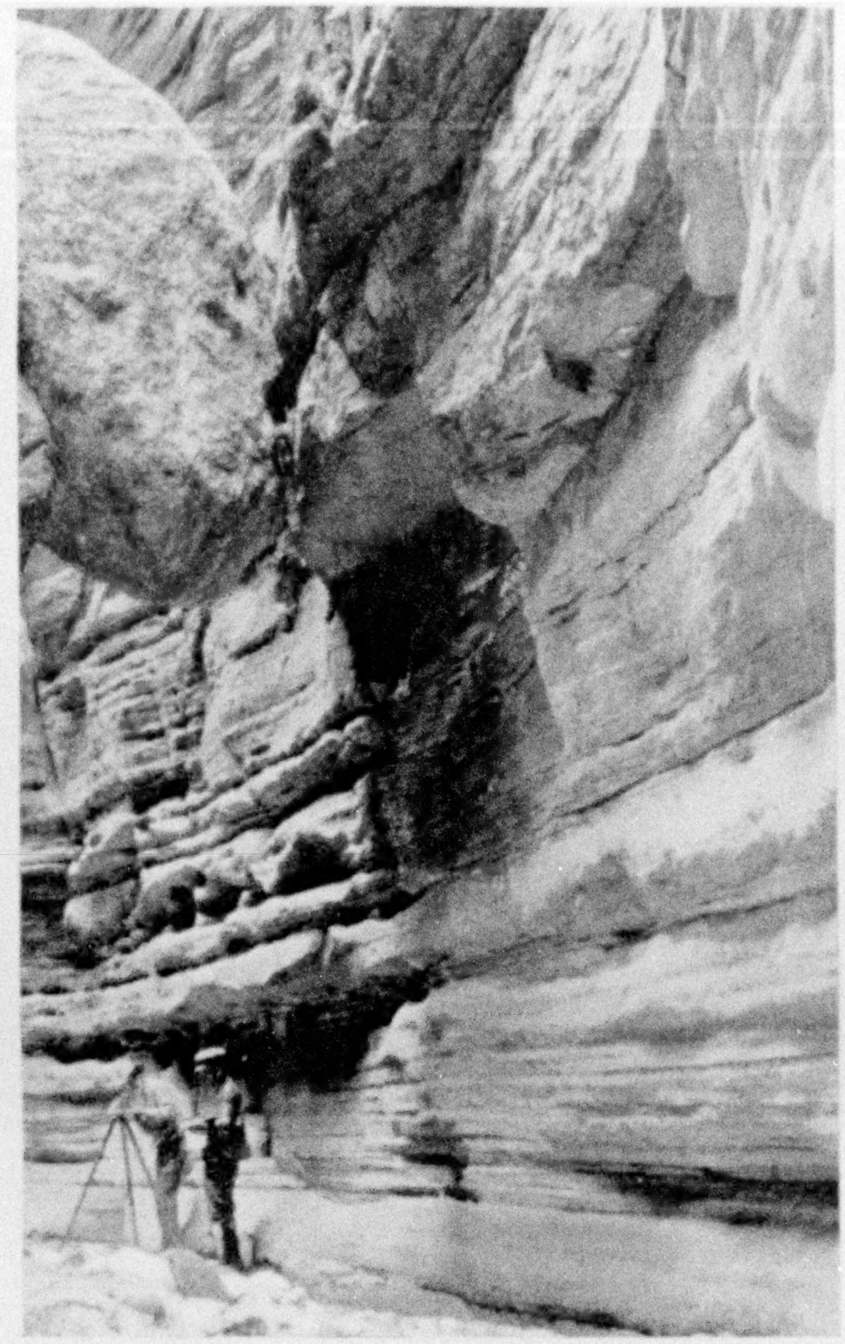
Powell's and Dellenbaugh's estimates of a fall of from 80 to 100 feet in a third of a mile, with waves 30 feet high and spray dashing double that height, prepared us for something on a big scale, though we knew that these figures were rather liberal.

The fact that this was the first major rapid, where the impossibility of climbing round made it necessary to carry the whole party on the boats, lent added interest to the Sockdologer.

The famous rapid was not an entire disappointment, for the initial fall proved extremely abrupt and the waves below were very high; but it was all deep water in mid-channel, with the combers by no means so sharp and broken as when underlaid by boulders. There was plainly no such menace in the rapid as in the Hance and several others already run, where the fall was over rocky obstructions.

As there was no chance to land to set up rods or instruments for nearly a quarter of a mile, some difficulty was experienced in running the survey line, but this was finally accomplished.

Blake and Kolb ran through with one



Photograph by Lewis R. Freeman

MOORE AND BIRDSEYE IN AN UNNAMED SIDE CANYON ABOUT 20 MILES ABOVE DIAMOND CREEK

passenger each; Lint and I with two. The height of the waves was much greater than any we had previously seen, but their evener run gave the boats just enough time to lift over without burying themselves, as in the broken water of boulder rapids. La Rue was not much splashed on the stern of the *Grand;* Moore, on the bow, was bone dry. Not more than the usual amount of water came over the side to drench me and the cockpit. There were only three or four inches covering the bottom boards when I pulled into an eddy under the left-hand wall at the foot of the rapid.

All in all, the run through the Sockdologer was the best sport, from a boatman's standpoint, of any of the voyage, partly because of the great height of the waves and partly because we knew there were no rocks under them to bother about.

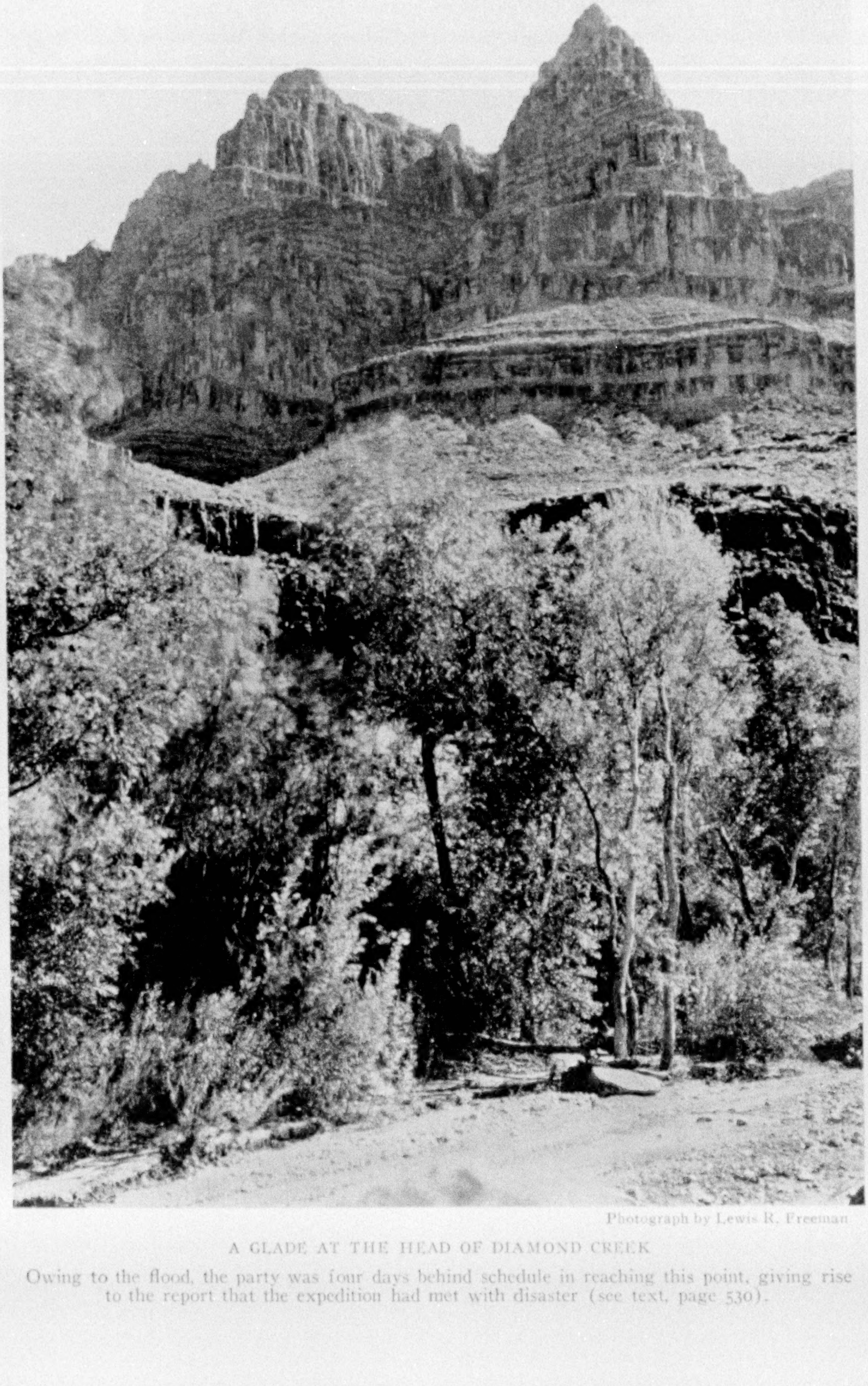
Burchard announced the fall of the Sockdologer as 19 feet—less than a quarter of Powell's original estimate and a little more than half of that of the conservative Julius Stone. My own rather vague impression of the height of the waves was from 10 to 12 feet; some of the engineers, with trained eyes for estimating, were inclined to think the largest combers were higher from trough to crest than the length of the boats—perhaps 20 feet.

The Grapevine Rapid, a few miles below the Sockdologer, proved of much the same character as the latter and gave us the same exhilarating runs. The remainder of the run to the mouth of Bright Angel Creek was lively, but not difficult boating.

After three days at El Tovar, the voyage was resumed from the Suspension Bridge (see page 500) on August 27. Hermann Stabler (see page 497) joined the party at the foot of Bright Angel Trail the following day. He was a valuable addition to the expedition.

The 70 miles of canyon between Bright Angel Creek and Havasu Creek, the lower boundary of the National Park, were marked by frequent major rapids, many of considerable violence. In spite of the fact that most of the previous navigators had met with serious disasters at various points in this rugged stretch of gorge, our good luck held and our mishaps were largely of a minor character.

Monument Creek Rapid, with seventeen-foot fall, and Hermit Creek, with sixteen, gave us fine slap-banging runs, but nothing worse than good soakings. Hermit Creek, the one major rapid in the Grand Canyon readily accessible by trail



Photograph by Lewis R. Freeman

A GLADE AT THE HEAD OF DIAMOND CREEK

Owing to the flood, the party was four days behind schedule in reaching this point, giving rise to the report that the expedition had met with disaster (see text, page 530).

Photograph by E. C. La Rue

TRAVERTINE FALLS, FIVE MILES BELOW THE MOUTH OF DIAMOND CREEK

from the rim, was run in the presence of a large and distinguished gallery from El Tovar—rather a novel experience for both parties.

KOLB HAS AN UPSET

The distinction of the first upset fell to Kolb while trying to run a rough and hitherto unnamed rapid a few miles above Havasu Creek. It occurred as a consequence of allowing his boat to draw into a deep hole under a large boulder, where it capsized, cupping him under the cockpit. He bobbed up 100 feet farther down and climbed out on the bottom of the overturned boat. With the assistance of Dodge, who jumped in and swam out to the derelict, it was brought to the bank 300 yards below the foot of the portage, and subsequently lined back. Neither boat nor boatman was injured. The event was commemorated in the name of the rapid—"Upset."

At the mouth of Havasu Creek 20 Havasupai Indians, under the direction of Roger Birdseye, brought down 800 pounds of provisions for the long stage to Diamond Creek. Here the cook, who had started with the party from Lees Ferry and who had asked to be relieved some weeks previously, was replaced by a genial Pole, Felix Koms, who completed the voyage with us. The unfailing good nature of the new chef, under conditions which must have been very trying to a roly-poly dumpling of a man weighing 225 pounds, won the affection of every one in the party.

The radio set was sent out from Havasu for repairs, to be brought back to us at Diamond Creek, 70 miles below.

FLOOD SWEEPS DOWN; WARNING NOT RECEIVED

Pushing off from Havasu with deeply loaded boats on the morning of September 15, we came, after three and a half days, to the head of Lava Falls. The skies had been clear most of the way, but violent wind squalls indicated that equinoctial storms were gathering to break upon the plateau region behind us.

If the radio set had been with us we would have received numerous messages broadcast from several stations in response to wires from Washington advising us that one of the heaviest storms of recent years had broken upon the basin of the Little Colorado and warning us to be on the lookout for the waters of a very heavy flood.

If such warnings had been received, we would have selected a broad open section, with ample room to back away from a rise, and waited for the flood to pass. Unwarned, we were surprised at a time

Photograph by Lewis R. Freeman

SHARP PINNACLE NEAR THE MOUTH OF DIAMOND CREEK, FROM FIVE MILES UP RIVER

and place far from favorable—twilight on the brink of Lava Falls.

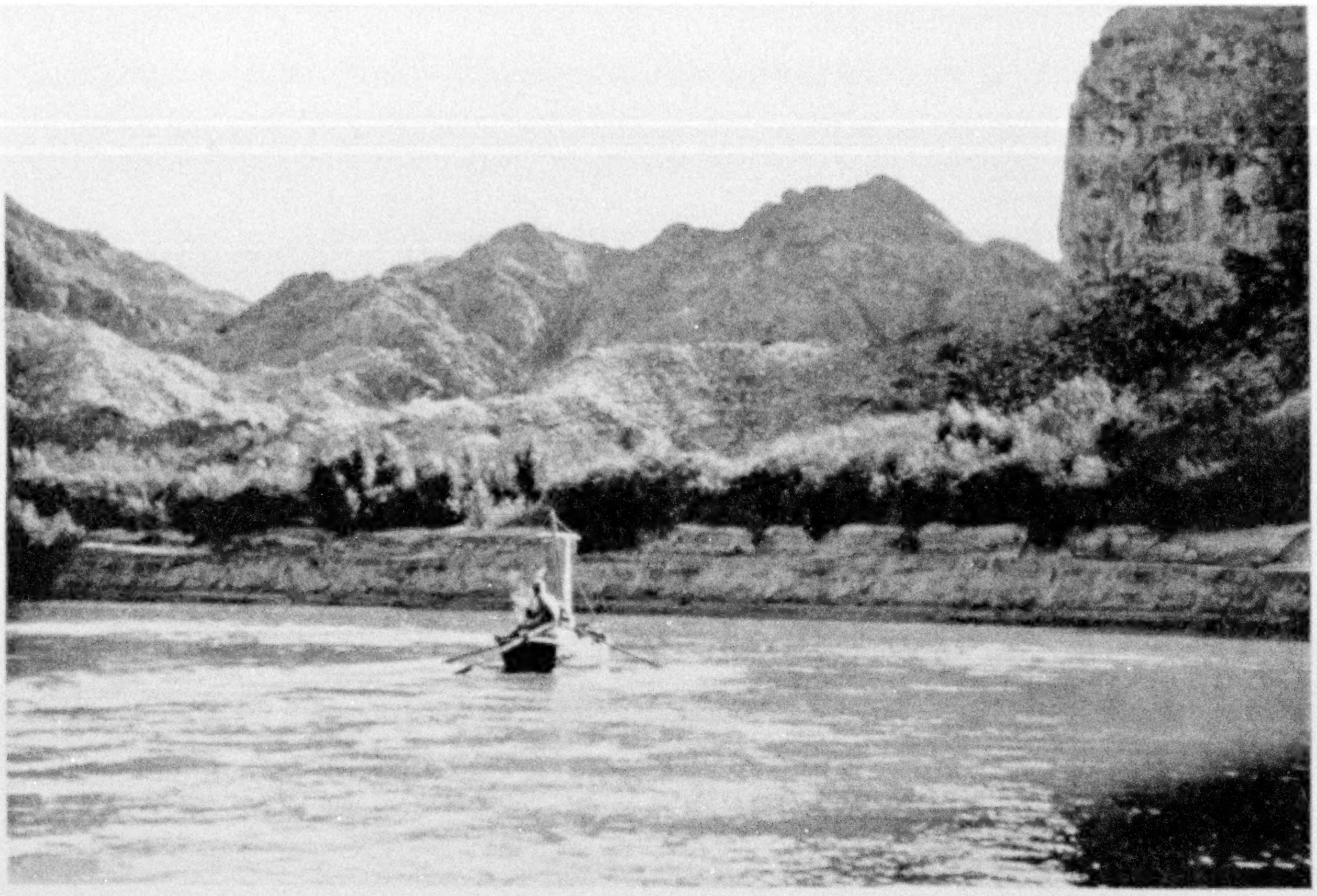
As the boulder barrier at the head of the rapid offered no runnable channel, the boats were lined down the right side of the most violent section to a narrow crescent of beach below. Beds and cooking outfit were left at the head of the falls, where a few patches of sand among the boulders offered the only feasible camp site. The rest of the outfit was carried down to the boats and restowed in preparation for an early start in the morning. The portage was completed an hour before dark.

Immediately after supper it was noticed that the boats were awash at their moorings, and a few minutes later the beach upon which they had rested was completely submerged by the rising river. As there was no place but the sharply sloping hot-springs formations on which to pull them up, they soon began banging heavily, while the waves from the rapid increased in weight. The *Grand* was in the worst position, being immediately under a ten-foot wall of travertine, with boulders all about. The other boats, for a while, could be drawn up a foot or two at a time as the water rose.

I buffered the *Grand* off the rocks with driftwood until the water was midthigh deep, and then crowded her in to take her chance with the other boats. Meanwhile it had become evident that a better mooring place would have to be found at once, as there was room for only one boat upon the shelf to which the water had now risen, and only an empty one could be handled even there. This would have to be the cook-boat, *Marble,* as the other three were heavily loaded.

FINDING AN ANCHORAGE IN THE DARK

It was now quite dark. All chance of seeking a safer mooring by daylight had been lost. The rest was a night job. Lint and Kolb pushed off in the *Boulder*, the latter carrying an acetylene lantern, and the former pulling cautiously down the eddy beside the lower end of the rapid. The rest of us were kept busy pulling in the three remaining boats and preventing their destruction on the rocks. Lint and Kolb returned in half an hour; they had left the *Boulder* on a sloping beach of



Photograph by E. C. La Rue

SAILING IN THE QUIET WATERS OF BLACK CANYON, BELOW DIAMOND CREEK

limestone a third of a mile below, and recommended that the *Grand* and *Glen* be taken down also.

Kolb rode with me on the bow of the *Grand;* Lint with Blake on the *Glen.* The moon was shining on the opposite wall and a part of the rapid. The latter had lengthened greatly and was booming louder every minute. The illuminated strip of rollers was a ghostly gray and the effect curiously like that of wind-billowed canvas.

We ran as close as we dared to the left bank of travertine, over which streams from the hot springs were falling, gleaming white in the reflected moonlight. There was not much current in the eddy, but a heavy lop from the main chute of the rapid splashed against and occasionally into the boat.

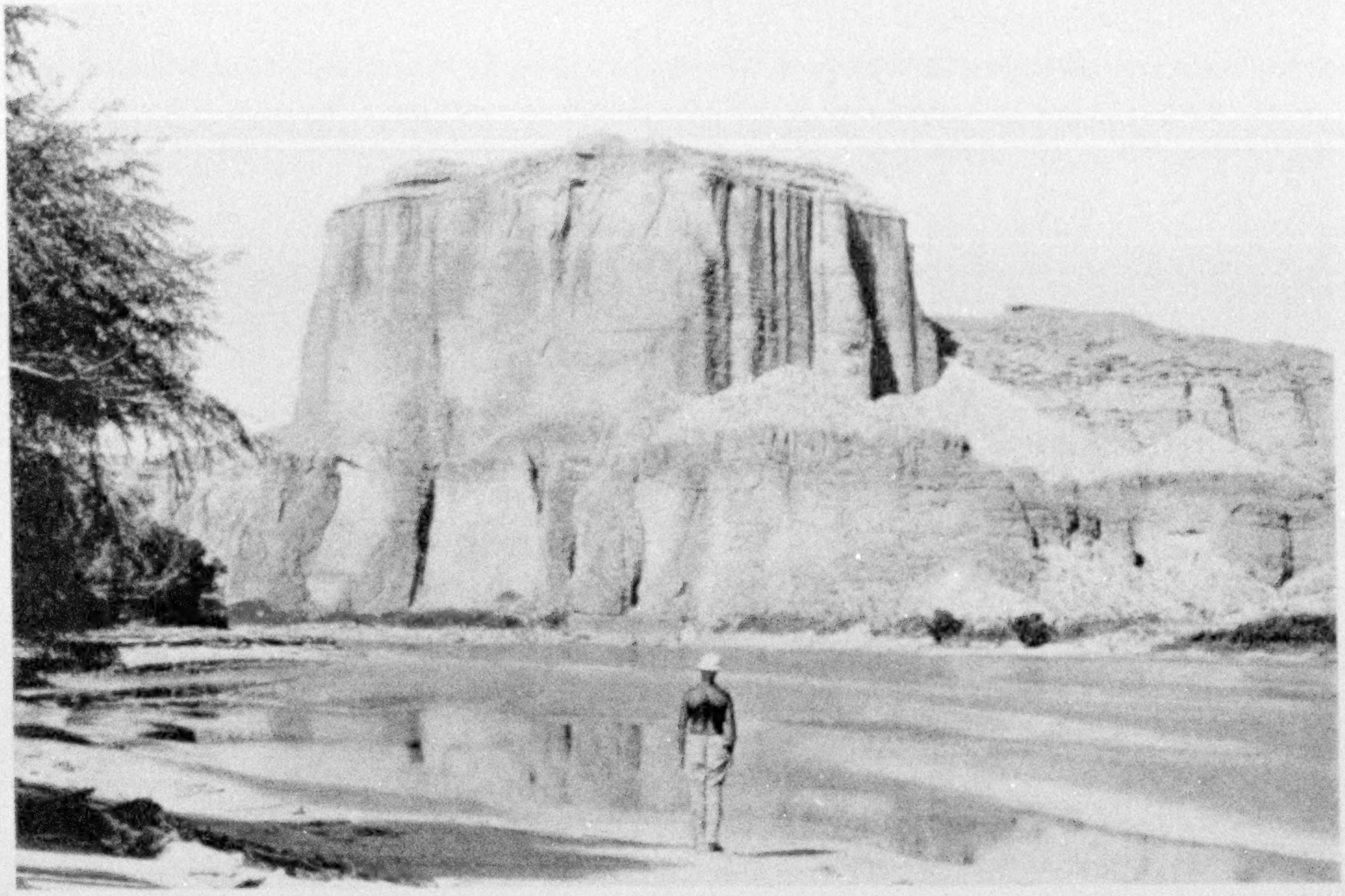
AN EERIE NIGHT RIDE

A distinctly unpleasant odor from the water suggested that the flood was coming from the Little Colorado (see text, page 475). Mingled with this was a humid, almost tropical, smell—rank vegetation and a suggestion of the perfume of flowers.

It was a weird and eerily stirring rather than a wildly exciting ride. Once or twice we were caught by the powerful downrush of the rapid, but a stroke or two brought the boat back to the half-water on the verge of the eddy.

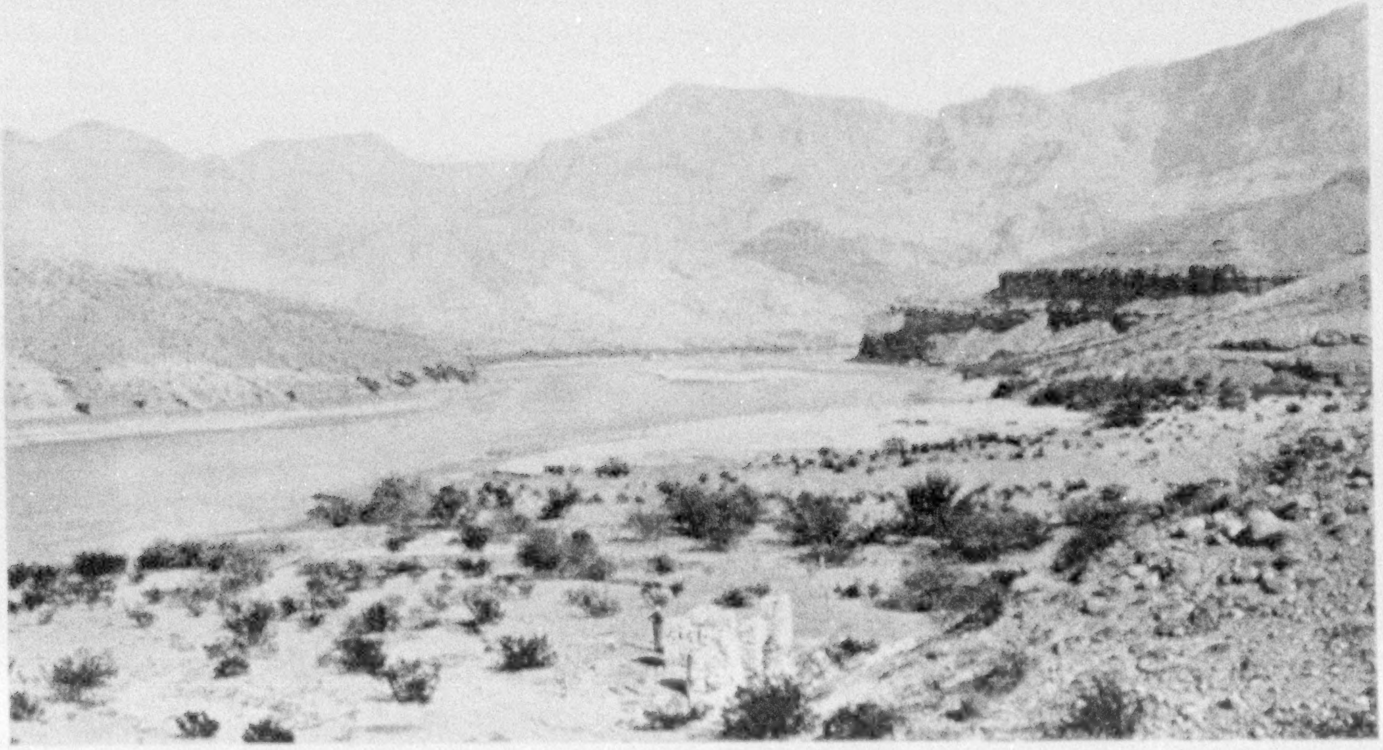
As we doubled cautiously round a jutting point, a new roar from down-river cut into the heavier boom of Lava Falls. Evidently we were nearing a second rapid not far below where the gleam of the tail of the first was quenched in the shadow of a moon-blotting cliff. Then a bay opened up to our left and I pulled into quieter water and beached the *Grand* beside the *Boulder,* on a sloping shelf of travertine.

As there had been no chance to get my bed in the rush of pushing off, I took a lantern and started back to camp as soon as the boats were secured. It was vile work pushing across the slushy, crumbling springs formation, with a tangle of rotting vegetation underfoot and huge thistle and saw-edged grasses growing higher than my head. These pricklers and cutters were particularly unpleasant, since my sole protection against them was half a pair of knickers and one tennis shoe.



THE "TEMPLE," A BUTTE OF CONGLOMERATE ABOVE THE MOUTH OF VIRGIN RIVER

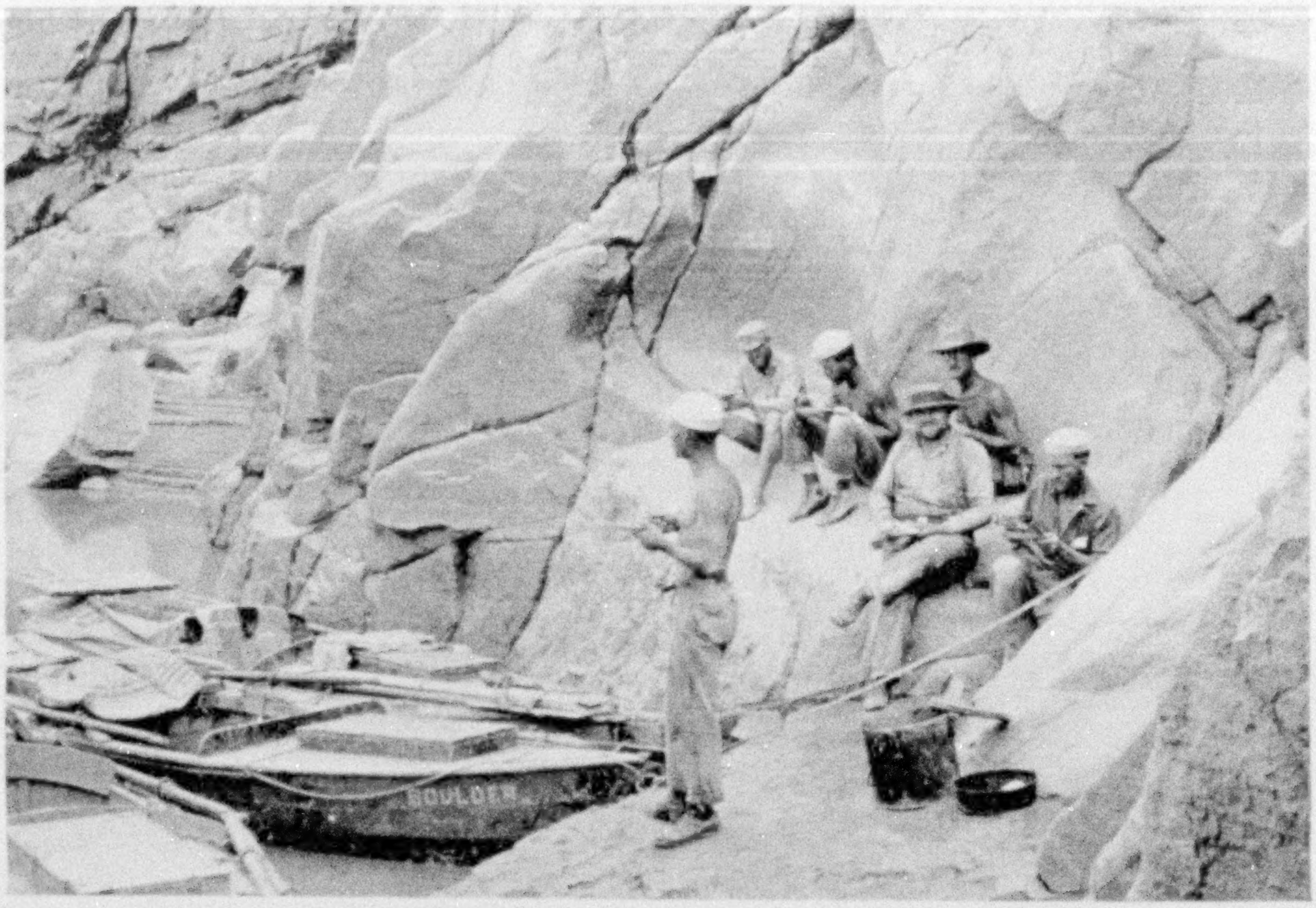
Virgin River enters the Colorado just above the point where the major stream makes its final sharp right-angle turn, flowing due south (see the Map of North America supplement).



Photographs by E. C. La Rue

LOOKING UPSTREAM TOWARD THE WEST PORTAL OF GRAND CANYON

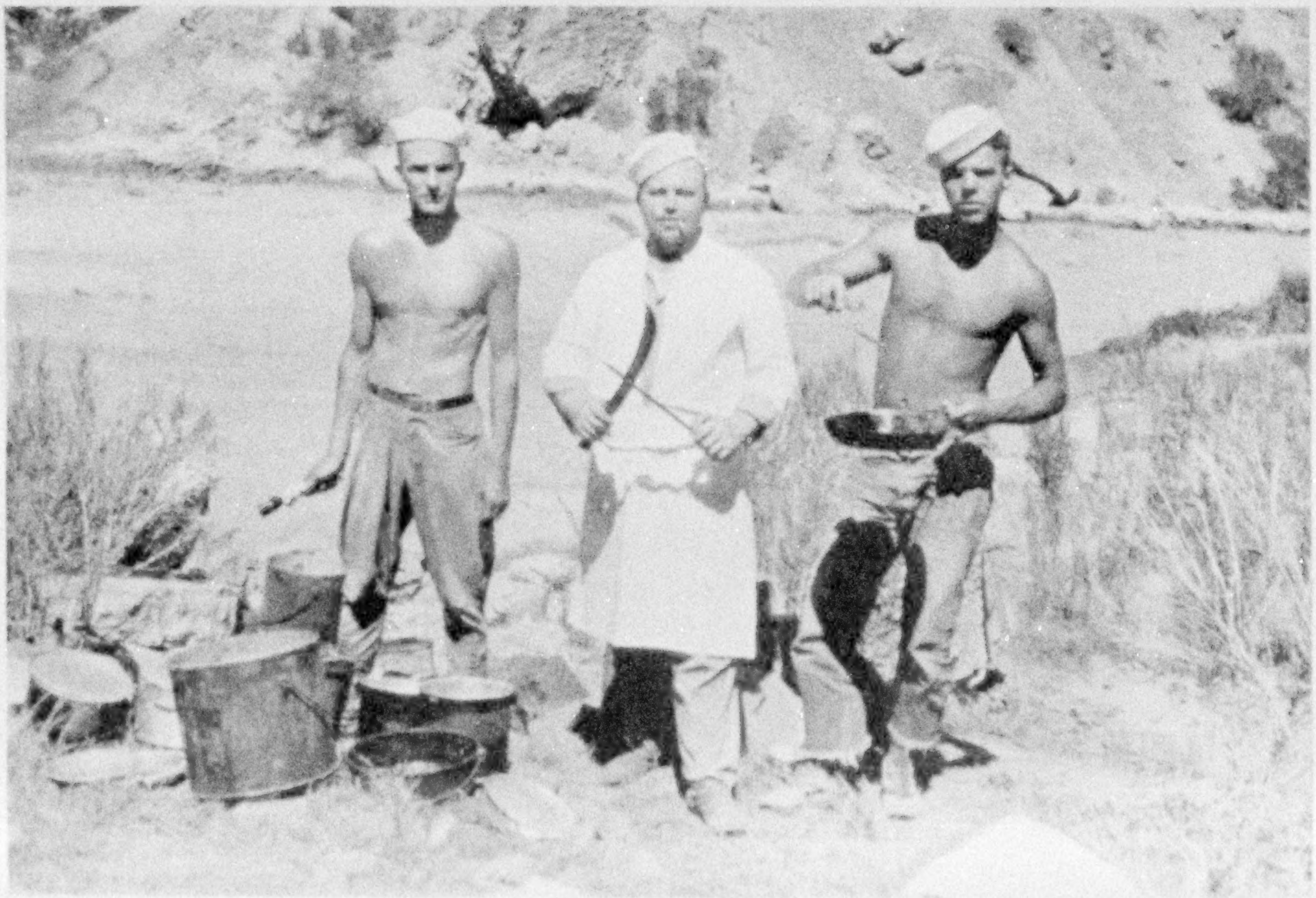
Note the ruins of the old stone house in the foreground. This was once one of the buildings at Pierce Ferry, where a wagon trail from Kingman to Moapa crossed the river.



Photograph by E. C. La Rue

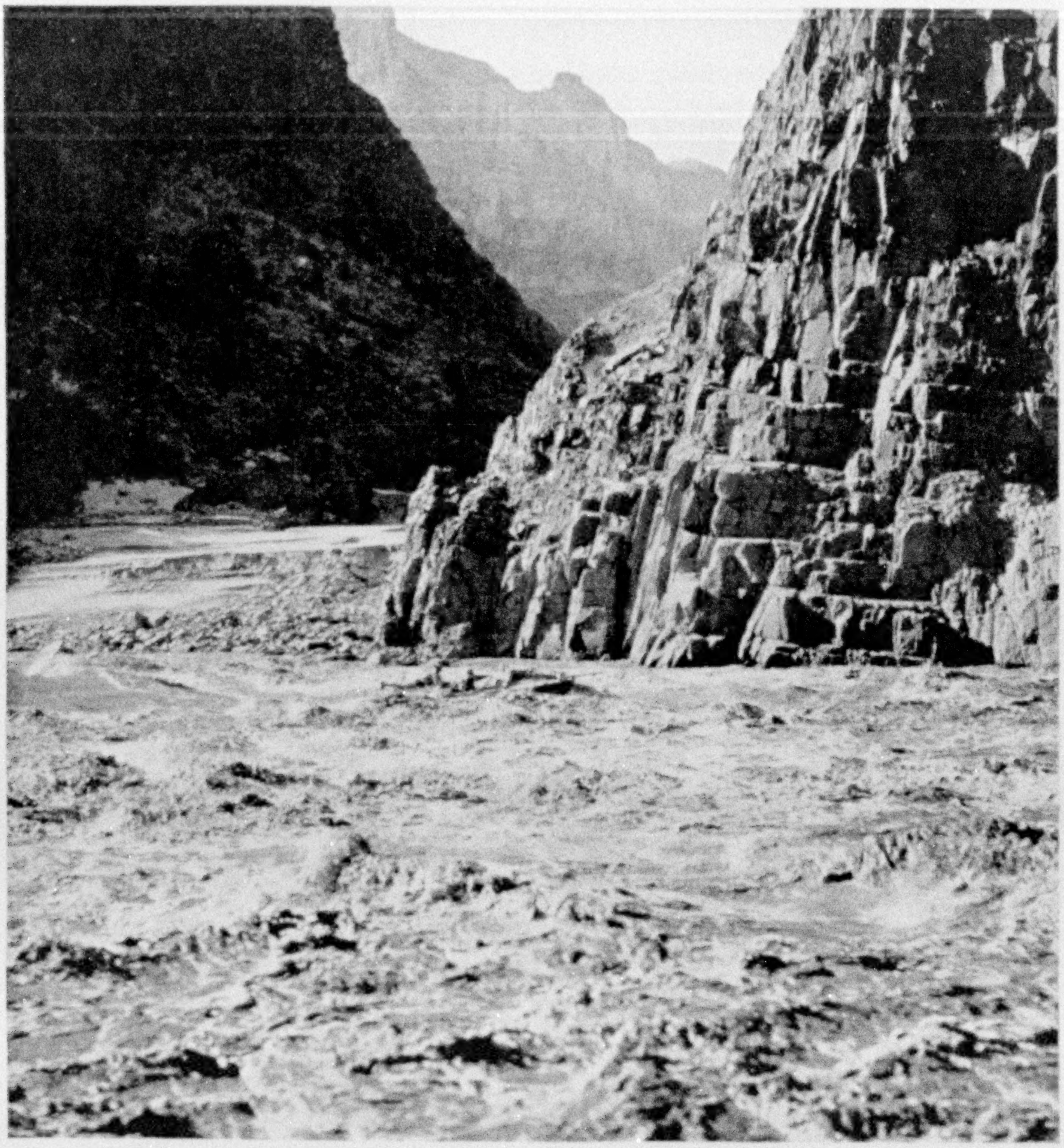
TIME OUT FOR LUNCH

On a narrow ledge 26 miles below the mouth of Diamond Creek.



Photograph by E. C. Kolb

FELIX, THE COOK, AND HIS ASSISTANTS, BLAKE (LEFT) AND LINT (RIGHT), AT DIAMOND CREEK



Photograph by Lewis R. Freeman

THE "MARBLE" IN A RAPID NINE MILES BELOW DIAMOND CREEK

Note the two men clinging to the overdecked bow and stern, while the oarsman in the cockpit pilots the craft.

After fording three or four warm streams, I finally broke through to more open going, but even here there were many cacti. The last 100 yards was along the cliff and over boulders, among which the rising flood was already beginning to swirl.

There were zest and exhilaration in the blind ride in the half moonlight down the edge of the booming rapid, but the tortuous tramp back through the swamp of the hot springs was sodden grief all the way.

In my absence the *Marble* had been dragged several feet above the water, but the spray was already beginning to dash over her again, as the mounting waves banged higher and higher against the wall. I found every one in camp engaged in moving back from the encroaching flood.

RESCUING THE COOK'S BED

We had hardly turned in before it was necessary to scramble back over the boulders and give the *Marble* another hoist. Then we had a rest until an ambitious wave came up and surrounded the bed of Felix, the cook. The surprised sleeper awoke in such consternation that he fled, leaving bed and clothing behind in the water. Birdseye and Dodge salvaged the sleeping-bag, and Felix was put to bed again on a higher level.

By morning the water was up to our feet, where we had rolled in after our final move to the last bit of beach under the mesquite. The rapid had unbelievably altered in character overnight. The head of the dam of boulders, where the previous day there had been a series of abrupt falls, was now completely submerged. Over it rushed a broad, solid chute of wildly running water which did not begin to break into waves until halfway down what had formerly been the rapid.

From there on the combers were tremendous—the largest we had seen. They culminated in an enormous uptossed mass of churning, surging water just above where the boats were moored—a point where yesterday there was only a swift but comparatively smooth stretch of current.

This wave was a great boil or fountain, which at times measured all of from 15 to 20 feet from trough to crest. It appeared to be caused by conflicting currents rather than by a rock, and rarely assumed the same form twice in succession.

At times, in breaking back, it cupped down a large quantity of air, which, when compressed, threw out jets of spume like that from a cavernous blowhole on the ocean shore.

A continuous procession of drift logs of great size was moving down the river, some of the largest trees being up-ended and sucked down in whirlpools or, again, almost tossed out of the water. It looked barely possible that a boat might survive a run through the rapid, but only in the event that it could be kept away from several of the largest waves.

A RISE OF 21 FEET IN 24 HOURS

The river had risen 13 feet during the night, to which 8 feet more were added by evening of the second day. The hydraulic engineers of the party estimated the flow at from 75,000 to 100,000 second-feet. We learned subsequently that it had been more than 112,000—slightly greater than that of the last spring rise.

The *Marble* had finally to be hoisted up an almost sheer wall by block and tackle to keep it clear of the climbing waves. The other boats, after unloading, were more easily handled (see page 519).

After a three-days' halt to allow the flood to recede, we pushed off again on the morning of September 22. The increased weight of the water was evident the moment we were well into the current, and when it began to slop aboard in running the riffle under the cliff below it proved to be a veritable liquid mud. A splash of it left a white coating on the skin as it dried, while the effect on the eyes was almost blinding.

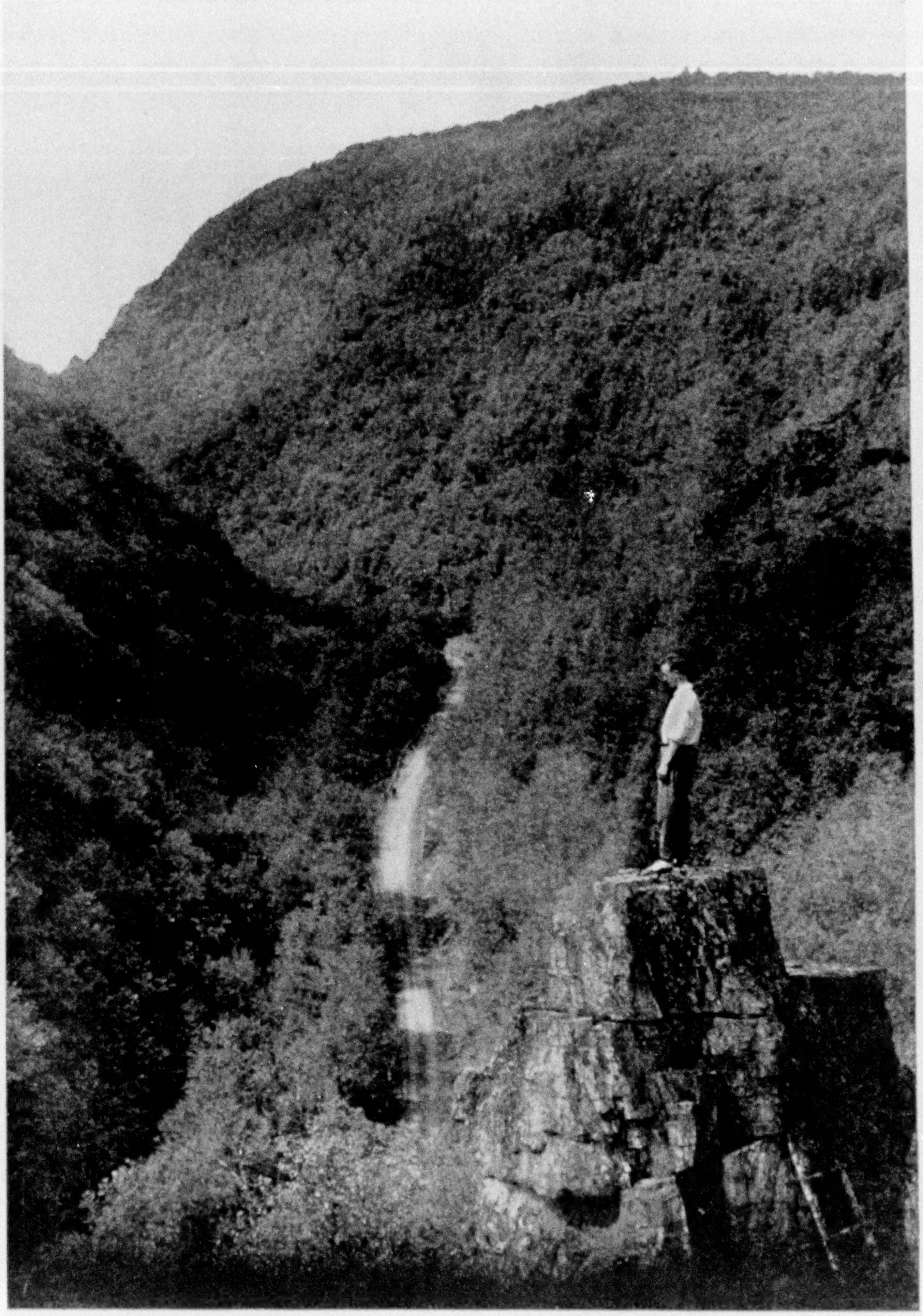
Although we had most favorable boating conditions, we were four days behind schedule in arriving at the mouth of Diamond Creek. This fact and the reported sighting of an overturned boat marked U. S. G. S. below the canyon were responsible for the sensational dispatches reporting that the expedition had met with disaster.

SEPARATION RAPID, WHERE POWELL'S PARTY SPLIT

Navigation became more arduous below Diamond Creek. Three days of rough boating in a river with an average fall of more than 15 feet to the mile brought us to the head of historic Separation Rapid, which, with its large canyons coming in opposite each other, was unmistakable from the descriptions of Powell and Stanton.

Here, according to Powell's story, three members of his 1869 party, believing the river expedition was doomed to disaster, deserted and climbed out to the plateau by the canyon from the north. After seeking in vain for a practicable portage along the sheer cliffs, Powell put into the rapid with two of his boats and went through without trouble. The three men who left were killed a few days later by the Indians, though their fate was not learned for many months.

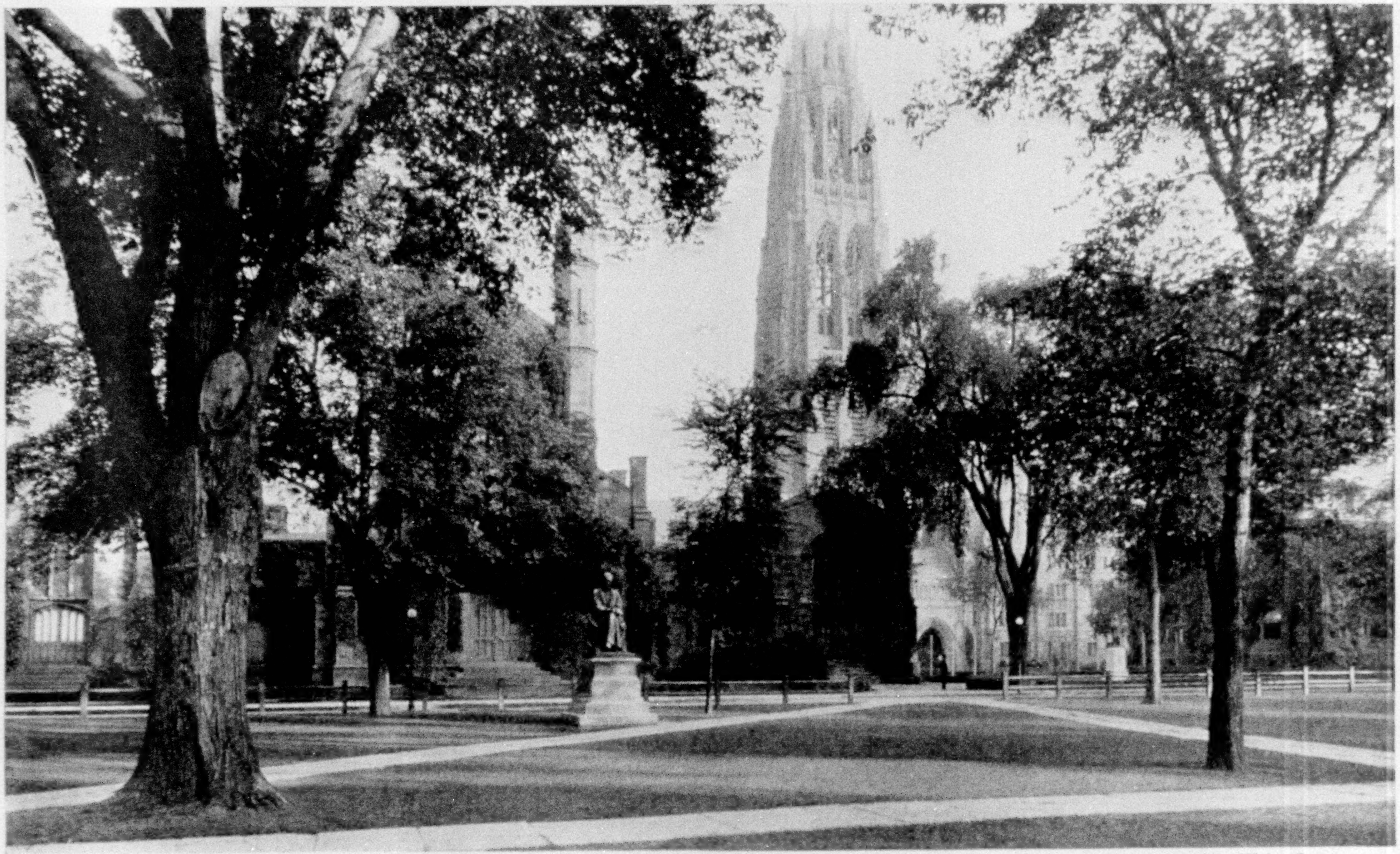
We had no more success than our predecessors in finding a way by which those not needed in the boats could climb round the rapid. Even Dodge, the rodman, who was all but fly-footed when it came to cliff-work, gave up after a persistent attempt to get by. The left wall



Photograph from R. H. Newcomb

DIXVILLE NOTCH, ONE OF THE MOST IMPOSING SCENIC FEATURES EAST OF THE MISSISSIPPI

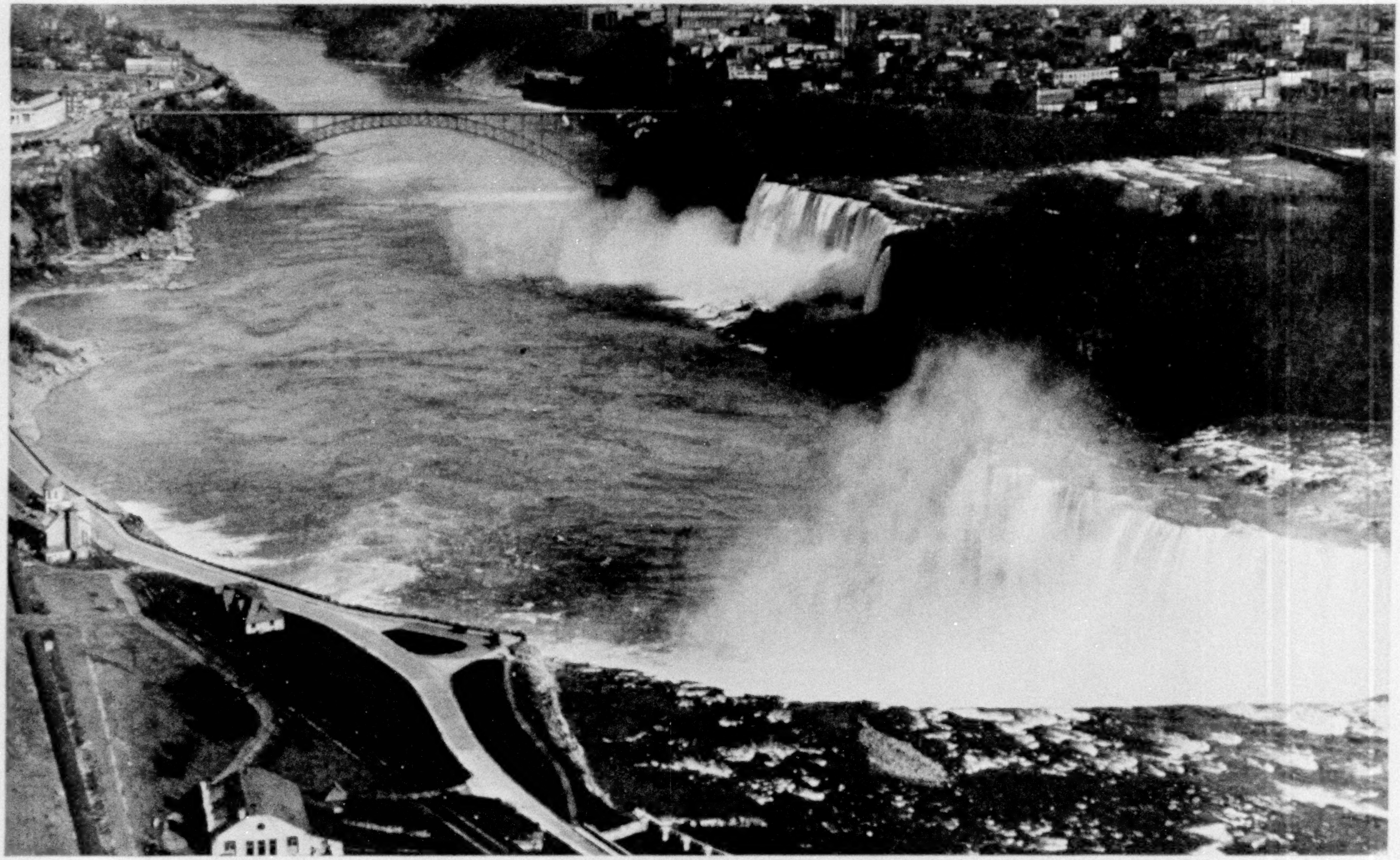
In the foreground is The Pinnacle, one of the numerous unusual rock formations of this wild ravine, situated near the apex of the State of New Hampshire.



Photograph by Walter Layman

A GLIMPSE OF THE GRACEFUL TOWER OF HARKNESS MEMORIAL QUADRANGLE THROUGH THE ELMS AT YALE UNIVERSITY, NEW HAVEN, CONNECTICUT

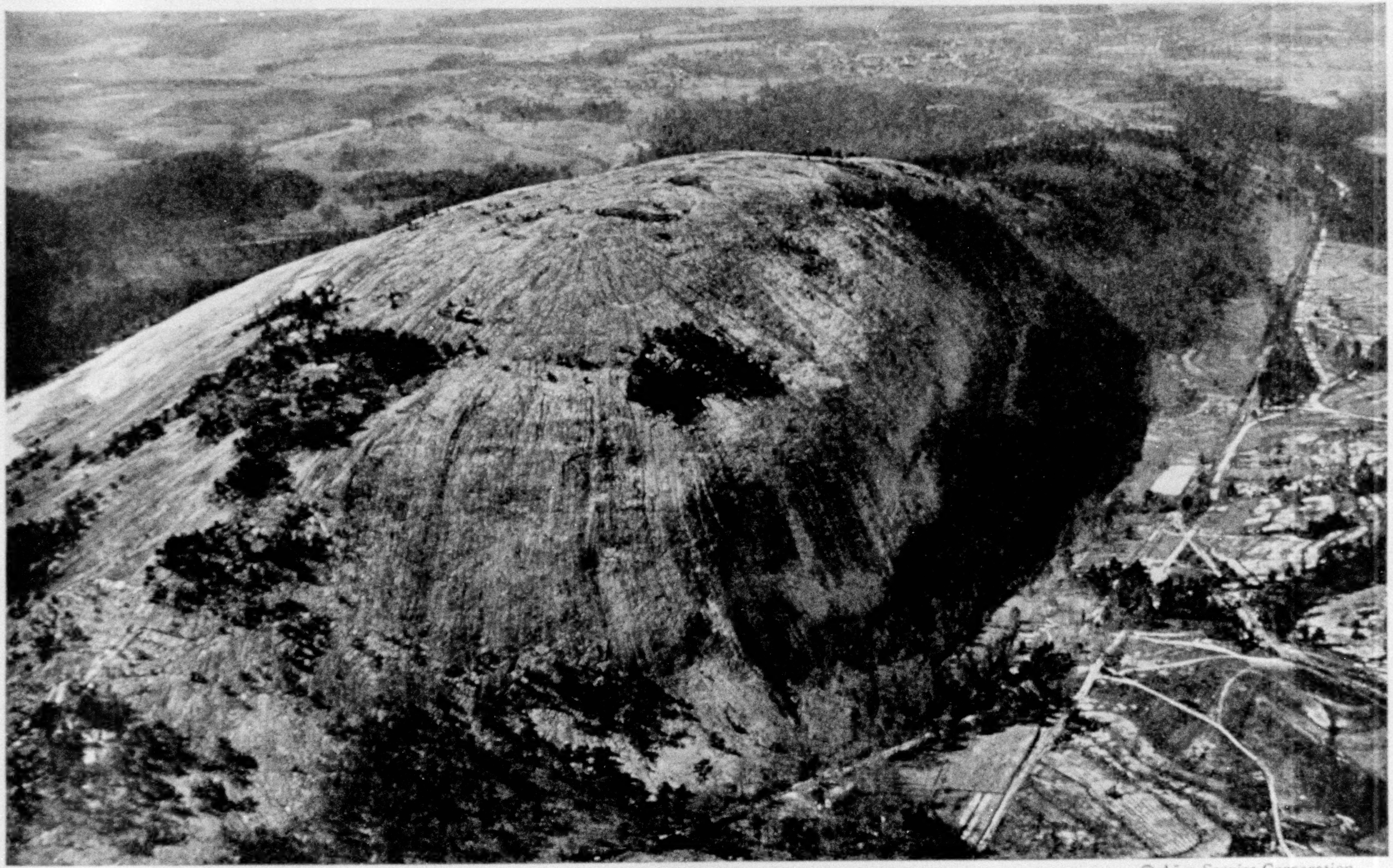
In this structure was installed recently one of the finest carillons in the Western World. On a still evening the music of the bells may be heard for miles beyond the confines of the campus.



Photograph by U. S. Army Air Service

NIAGARA FALLS FROM THE AIR

In the foreground are the Canadian, or Horseshoe, Falls; in the middle distance, at the right, is the end of Goat Island; beyond are the American Falls, below which the upper steel-arch bridge spans the gorge and joins the United States with Canada. Father Hennepin, a member of La Salle's party and one of the first white men known to have seen the Falls (1678), described them as "a vast and prodigious Cadence of Water, which falls down after a surprising and astonishing manner, insomuch that the Universe does not afford its Parallel."



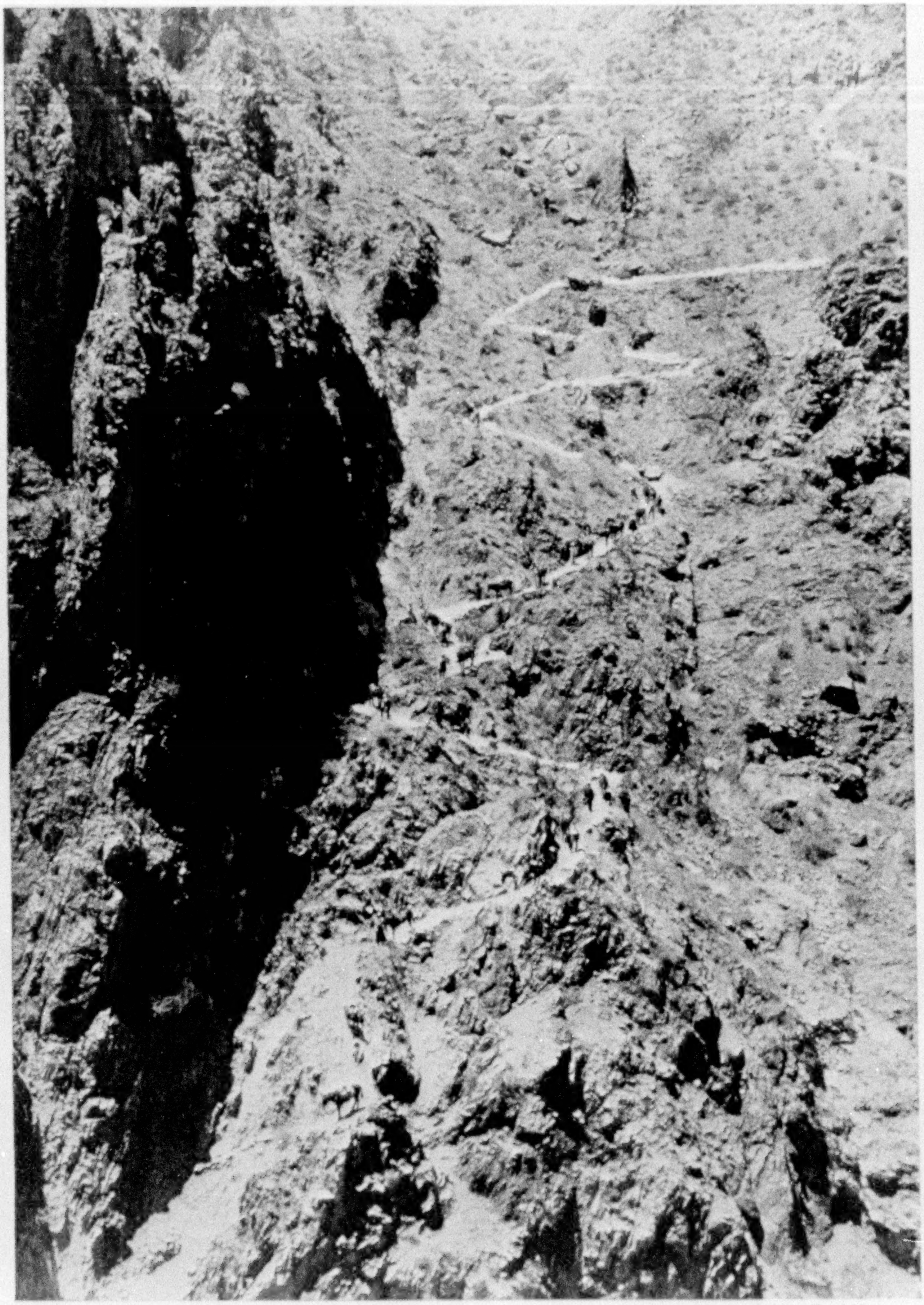
© Aëro Service Corporation

AN AIRPLANE VIEW OF THE LIVING ROCK UPON WHICH IS BEING INSCRIBED, IN GIGANTIC SCULPTURED FIGURES, A PAGE OF AMERICAN HISTORY

Stone Mountain, 18 miles east of Atlanta, Georgia, is a solid mass of granite 700 feet high. Upon its face is being carved a Memorial to the Confederacy (1861-65) at an expenditure of $2,000,000. The distance from the top of the hat of the central figure (General Lee) to the hoof of his horse will be 185 feet—equal in height to a 16-story building.

Photograph by H. Armstrong Roberts

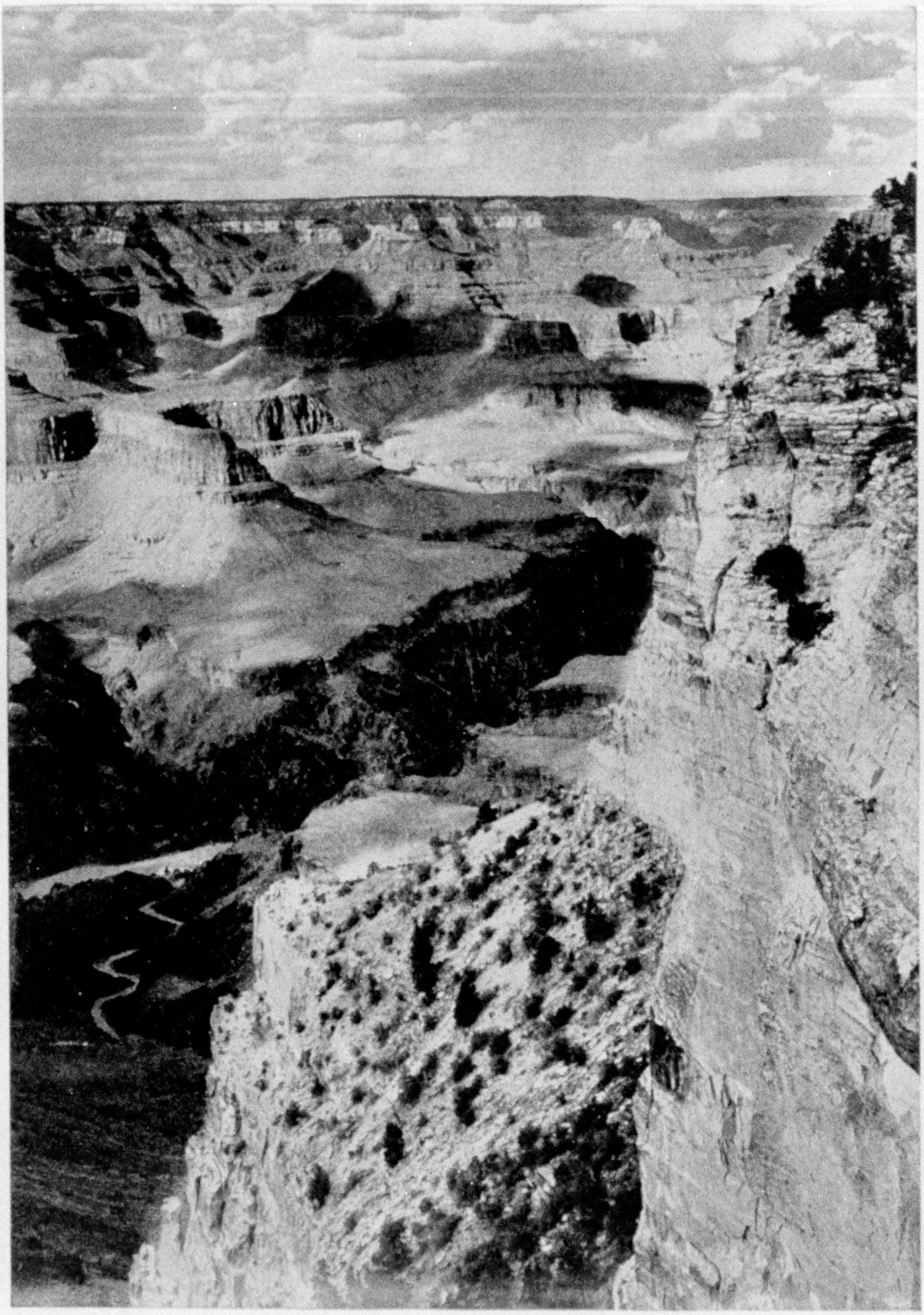
A LESSON IN OCEANOGRAPHY



Photograph by Fred Harvey

DEVIL'S CORKSCREW ON THE BRIGHT ANGEL TRAIL, GRAND CANYON NATIONAL PARK

The majority of visitors to Grand Canyon National Park make the seven-mile serpentine descent from the rim of the canyon to the river by this trail, requiring three hours on horseback and three and a half for the return. The name "Bright Angel" was given by Major Powell (see text, page 471) to the adjacent creek to offset the name of "Dirty Devil," which he applied early in his voyage to what is now known as Frémont River.



Photograph by Fred Harvey

THE GRAND CANYON FROM PIMA POINT, ON HERMIT RIM ROAD

"Clouds and the sunset, moonrise and the storm, transform it into a splendor no mountain range can surpass. Peaks shift and glow, walls darken, crags take fire, and gray-green mesas, dimly seen, take on the gleam of opalescent lakes of mountain water." A spectator standing upon the rim of this "First Wonder of the World" surveys a thousand square miles of varihued pinnacles, towers, bastions, and turrets carved from the rock by the tireless toil of irresistible water.

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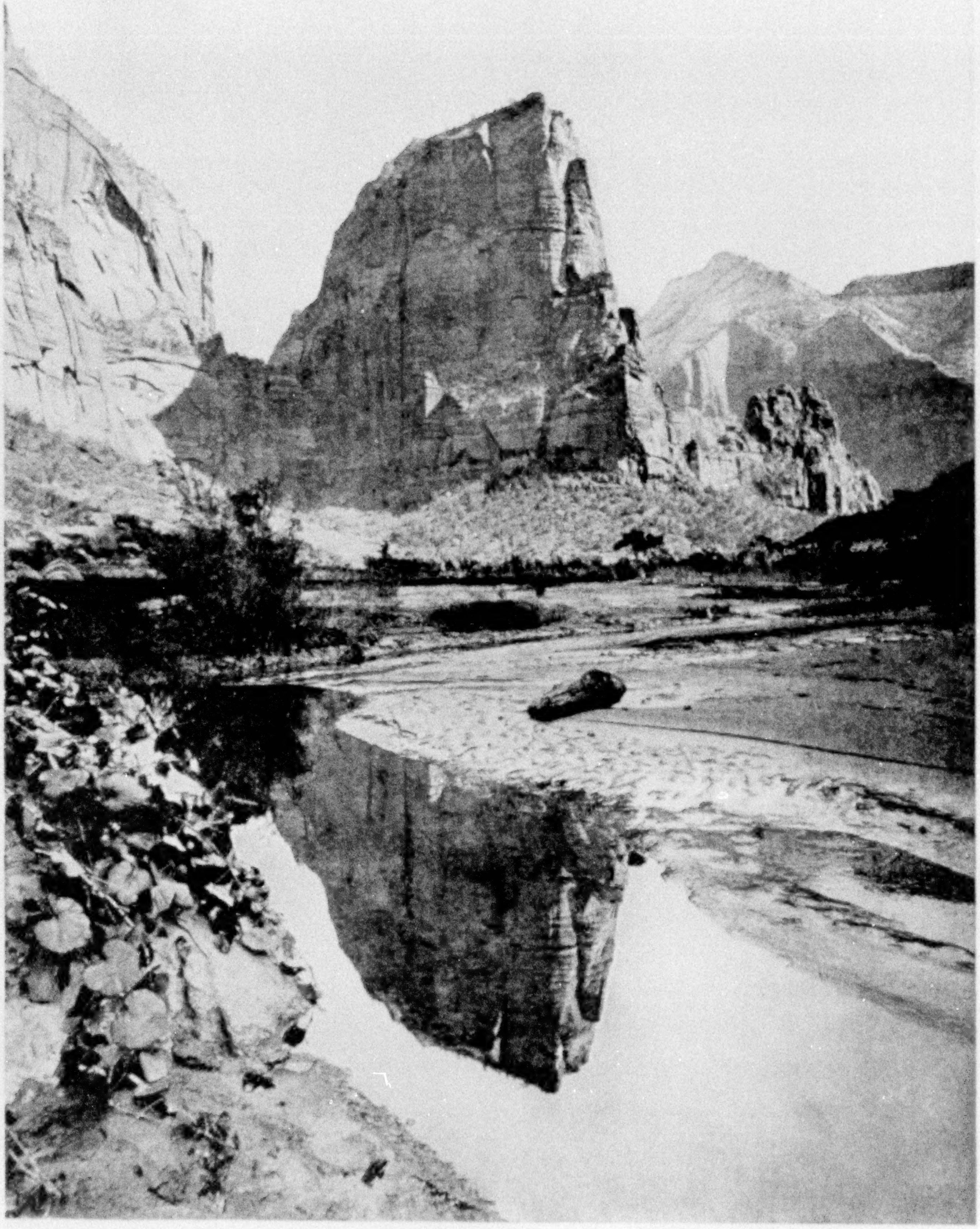
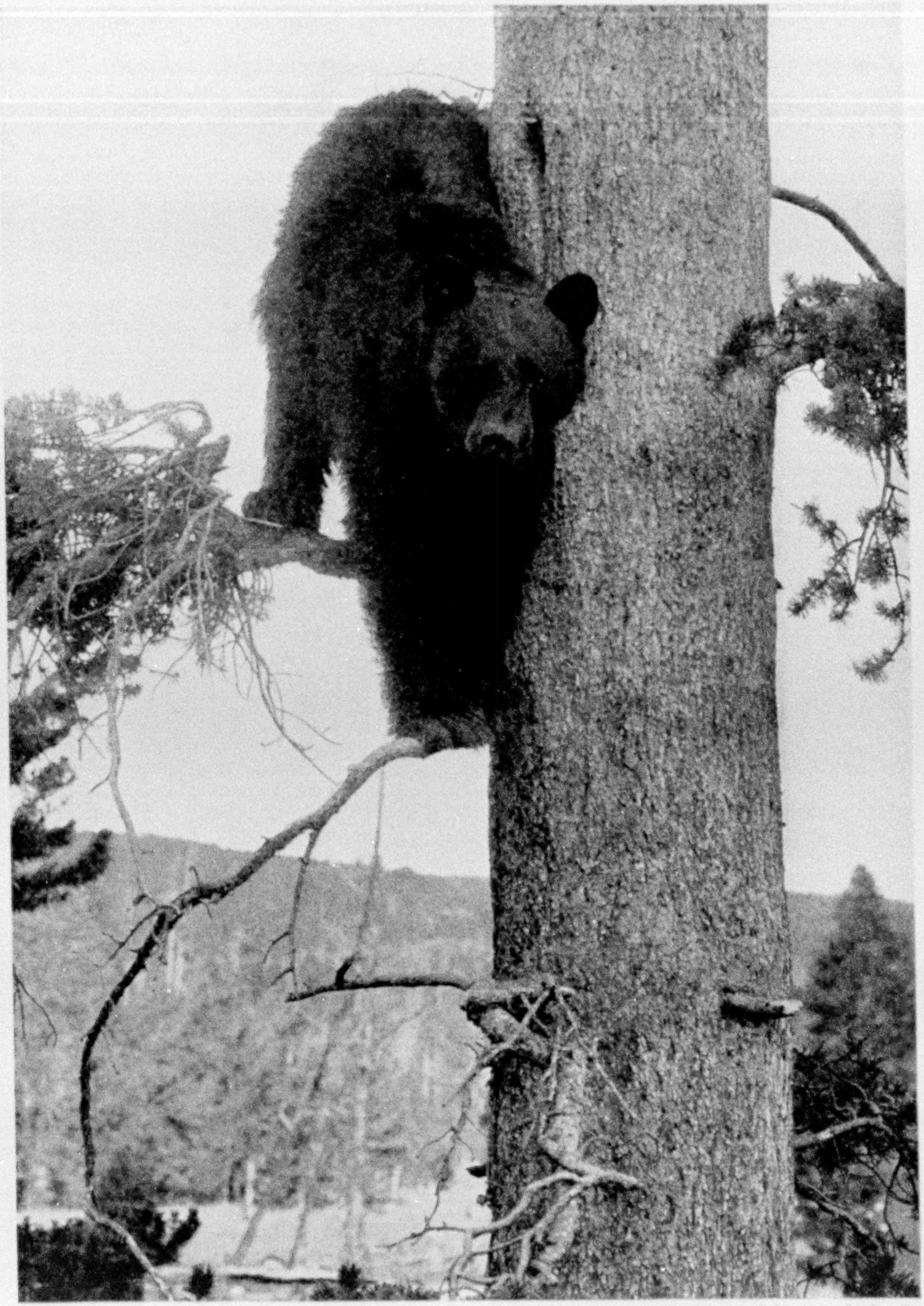


Photograph by J. K. Hillers

ANGEL'S LANDING AND ITS MIRROR: ZION NATIONAL PARK

The deep reds and browns of this gigantic pyramid are in peculiar contrast to the chalklike El Gobernador, which rises near by to a height of 3,000 feet.



Photograph © Haynes, St. Paul

A CONTENTED NATIVE OF YELLOWSTONE NATIONAL PARK

In the Yellowstone, one of the world's greatest wild-life sanctuaries, bears take care of themselves, but special consideration is given to herds of elk, antelope, and moose.

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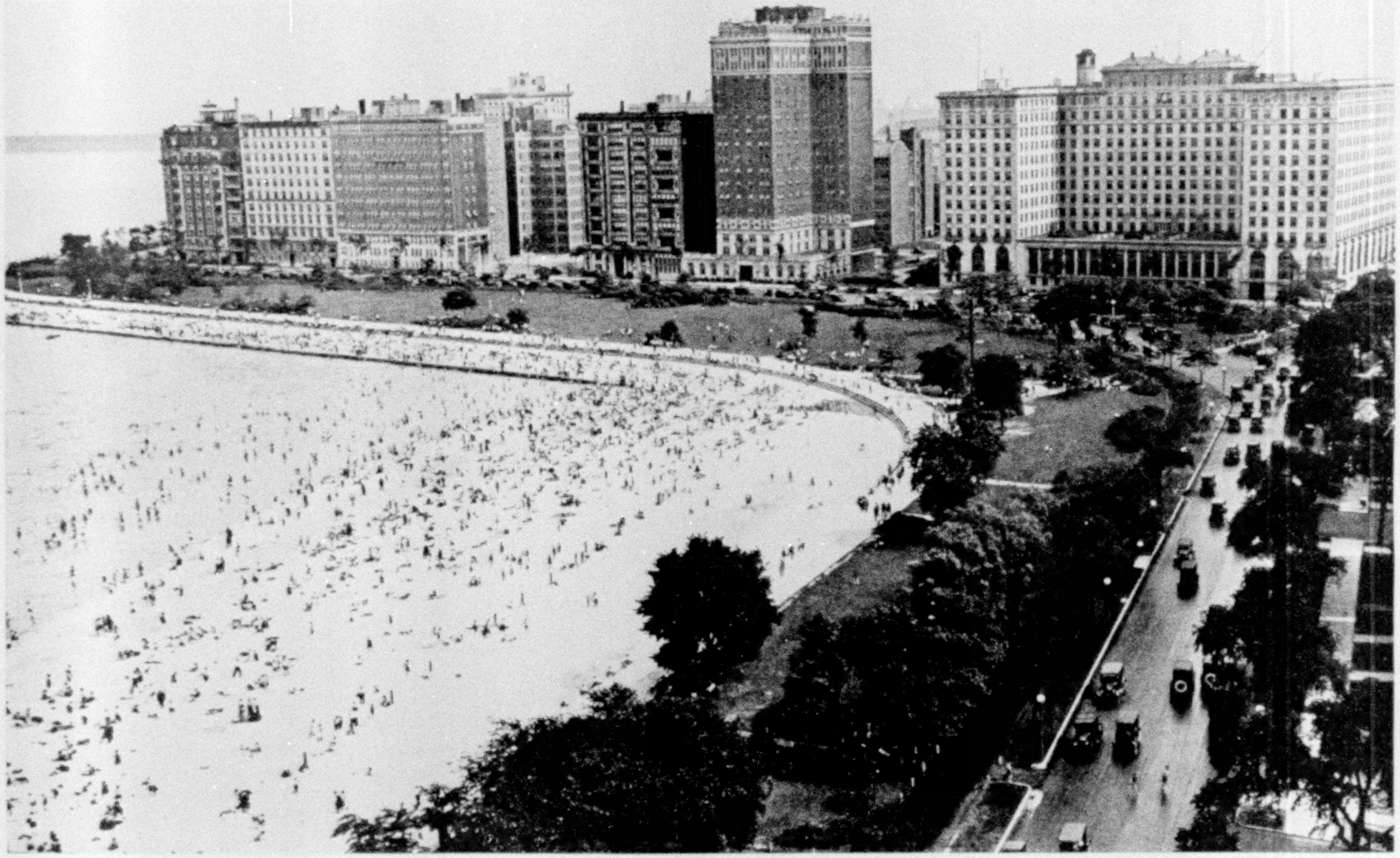
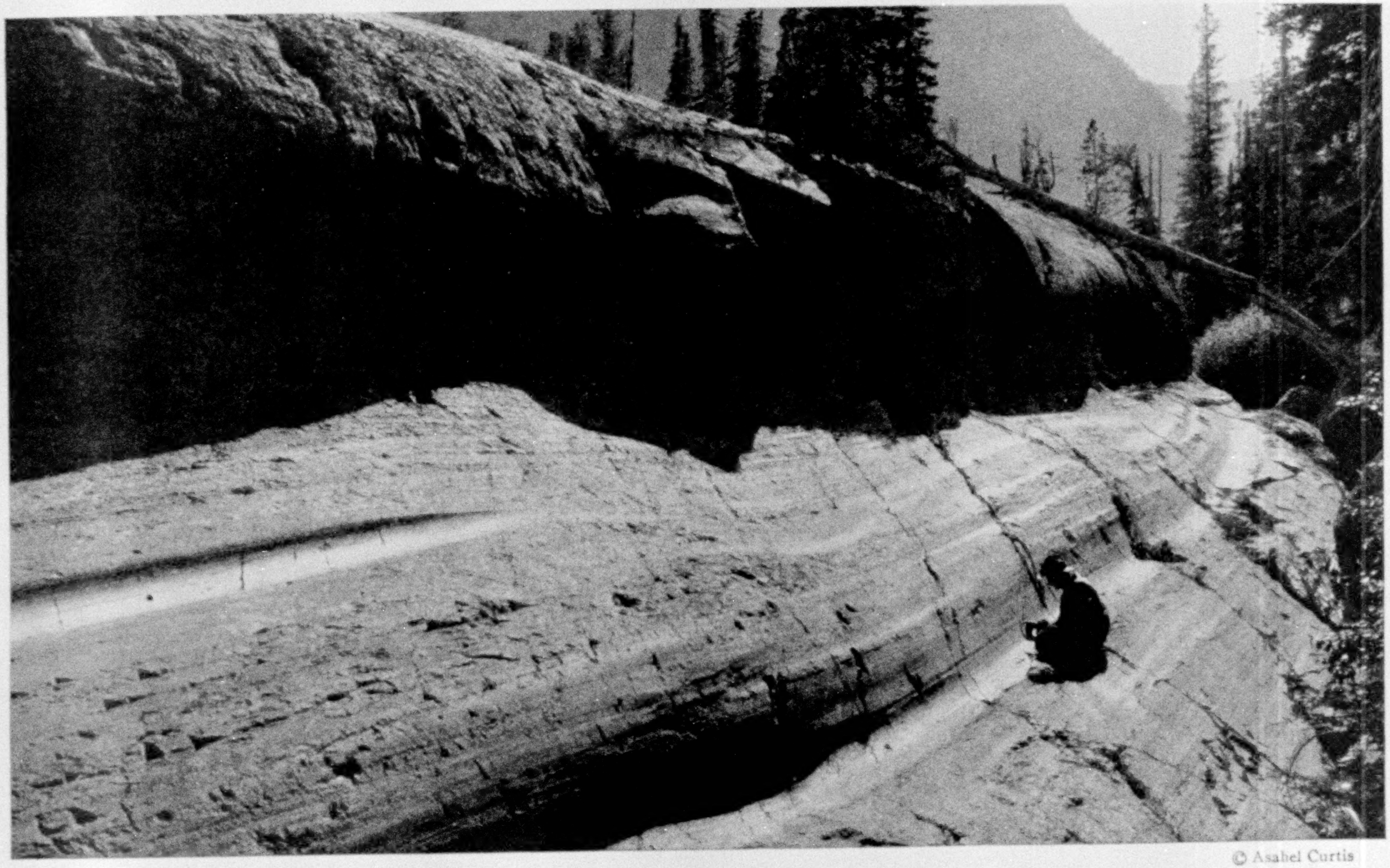


© K. D. Ganaway

A CHICAGO BEACH, WITH THE FAMOUS LAKE SHORE DRIVE IN THE RIGHT FOREGROUND

The buildings in the background are recently constructed hotels and apartments.



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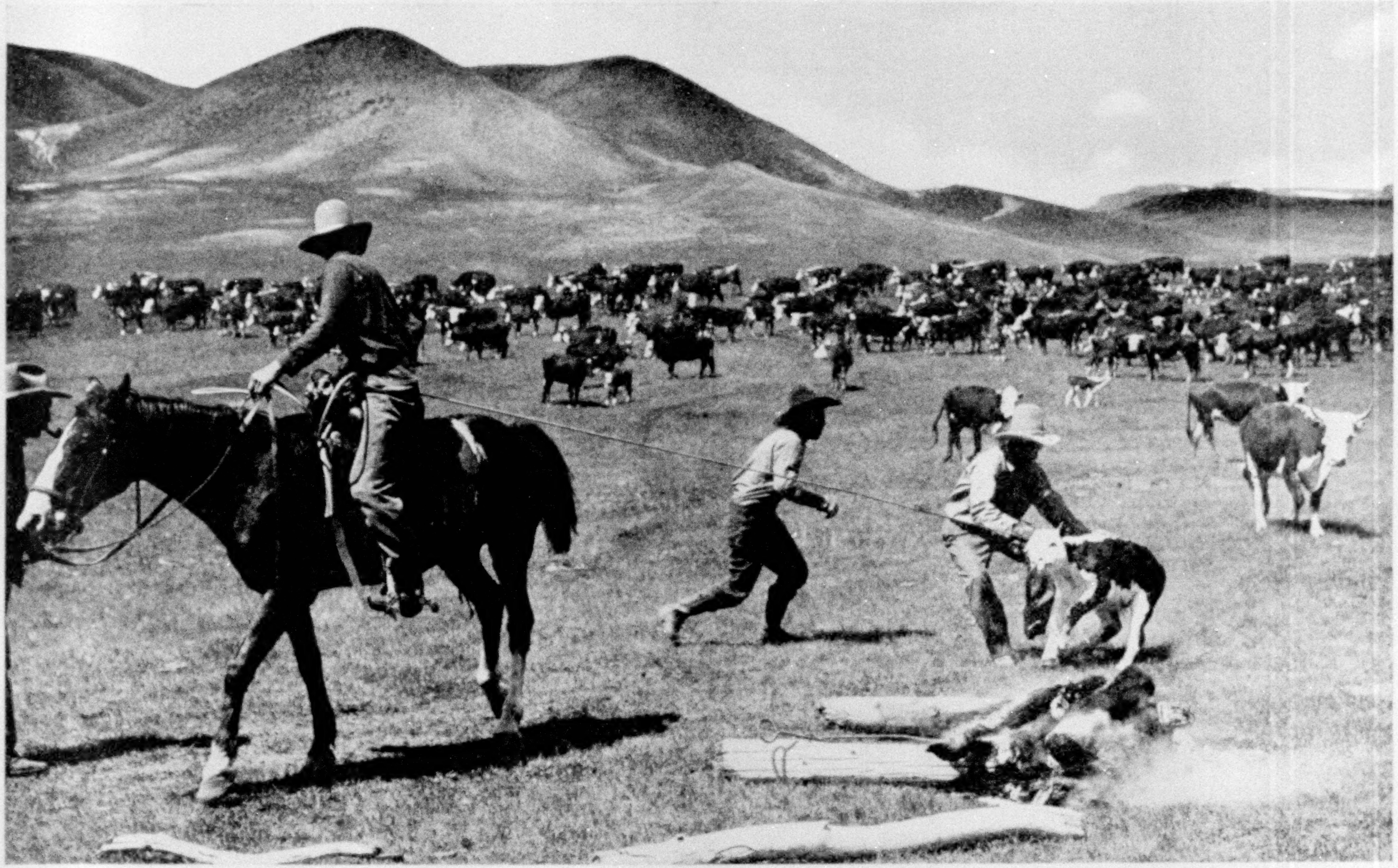
THE HANDIWORK OF NATURE'S MASTER SCULPTOR, THE GLACIER

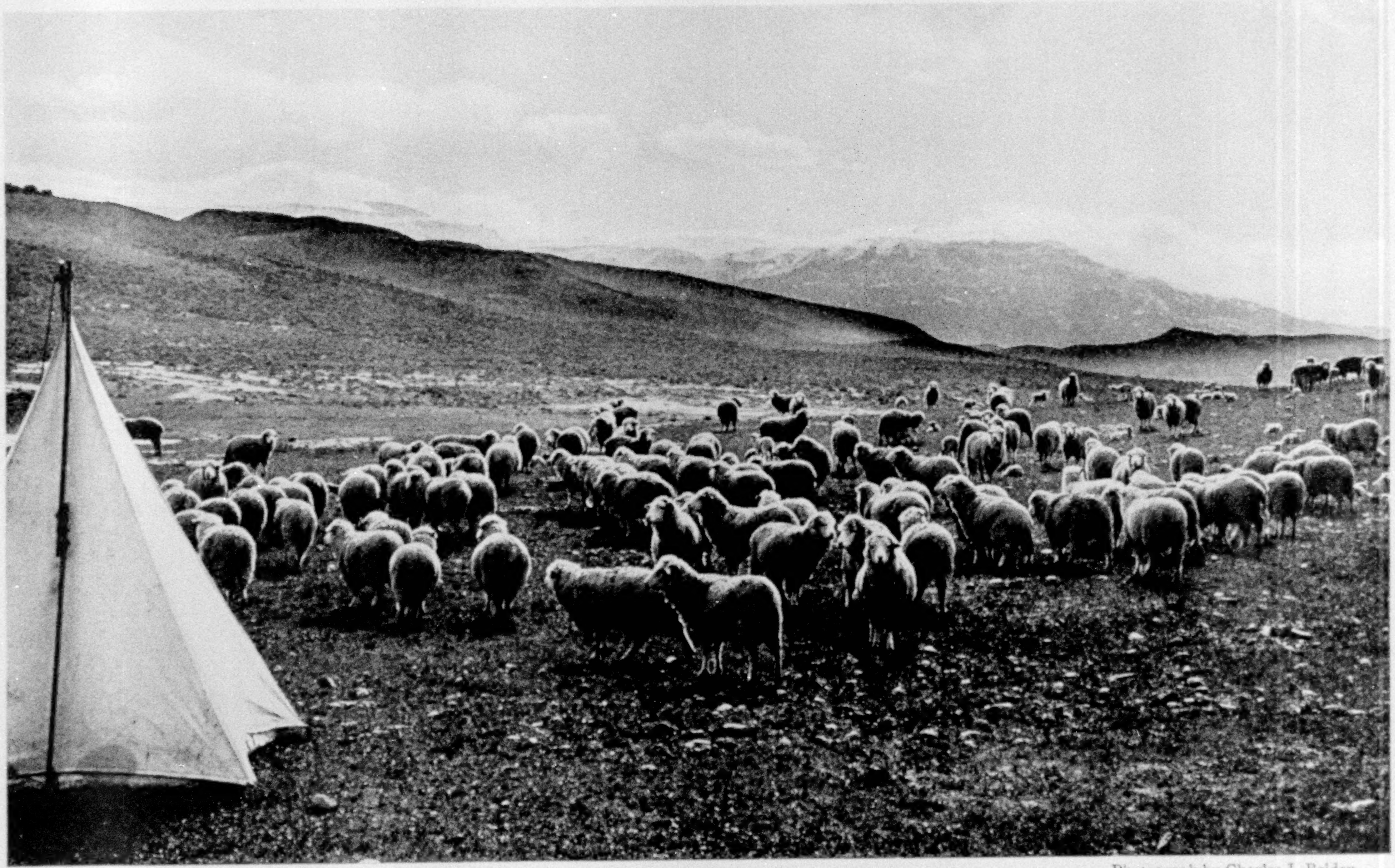
This scored granite forms the southeast wall of Glacier Creek Canyon, Montana



© Charles J. Belden

LARIAT PERSUASION

The calf is being induced, none too gently, to submit to the branding iron.



Photograph by Charles J. Belden

ON THE ROLLING SHEEP RANGES OF WYOMING

Two thousand ewes with their lambs can be herded by one man, assisted by a dog or two.

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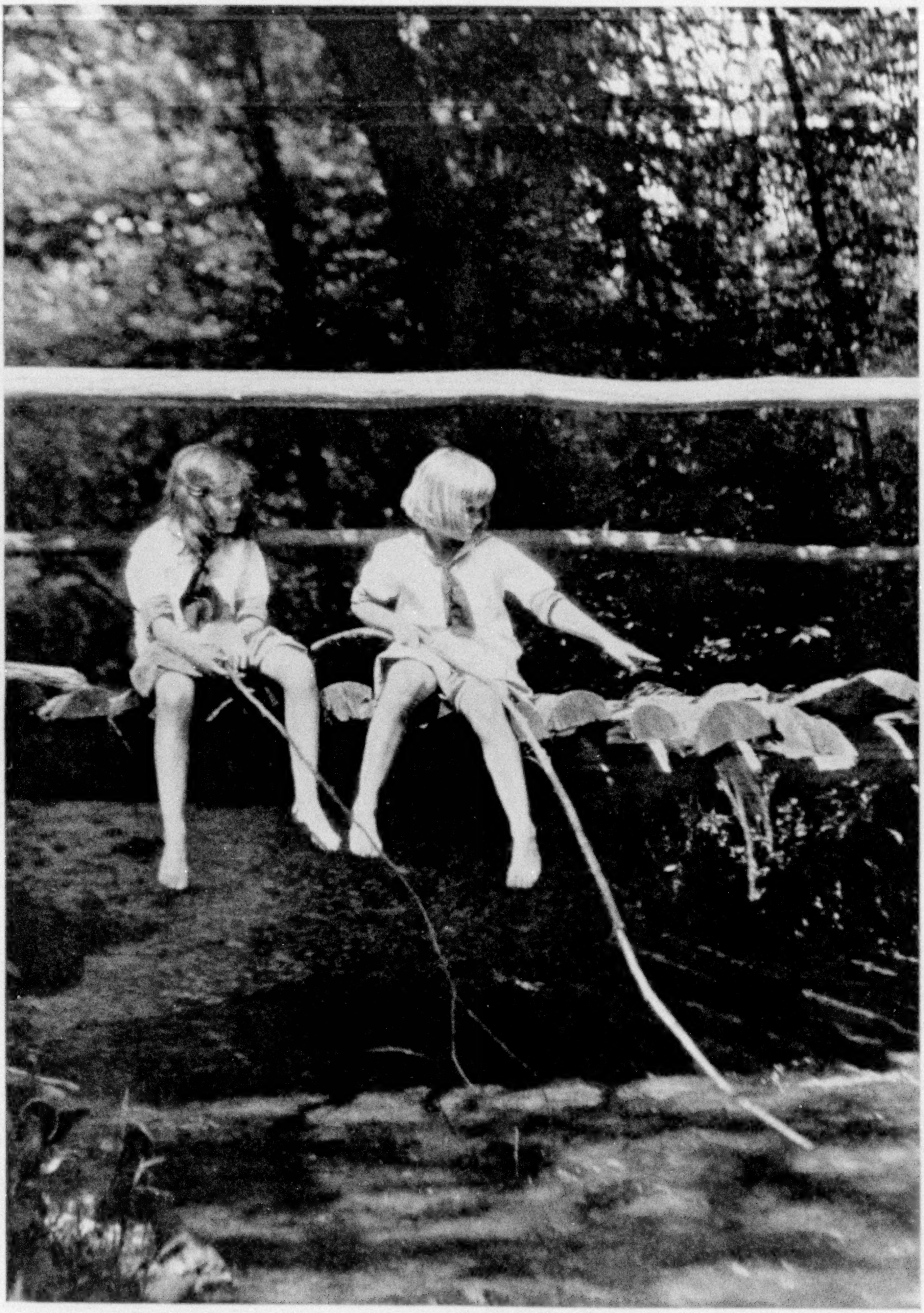
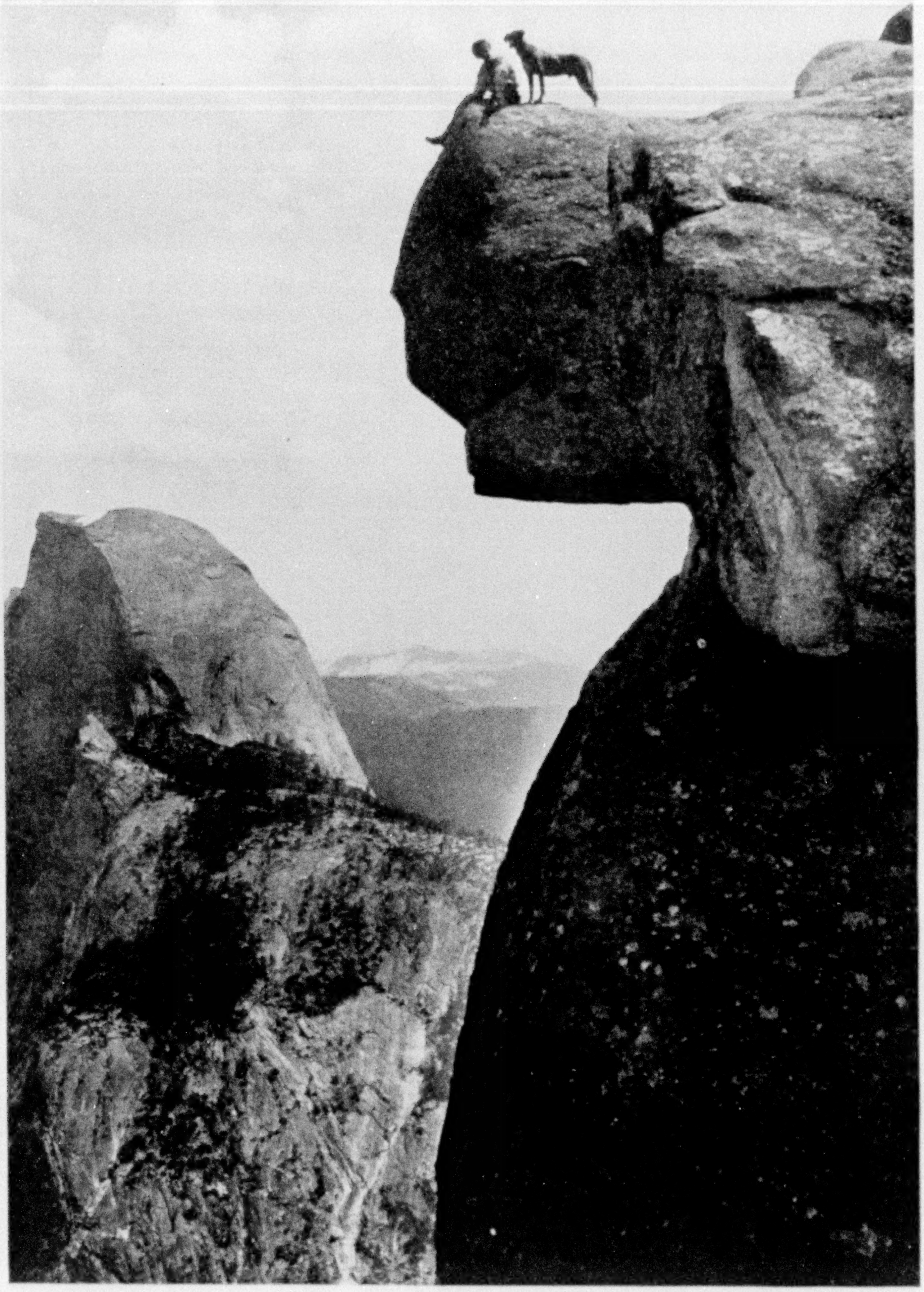


Photograph by H. Armstrong Roberts

BESIDE A WOODLAND STREAM NEAR GLADSTONE, NEW JERSEY



Educational-Bruce Photograph

MORE THAN 3,000 FEET ABOVE THE FLOOR OF YOSEMITE VALLEY

XUM

© Asahel Curtis

MOUNT SAINT HELENS, WASHINGTON, ONE OF AMERICA'S MOST MAJESTIC PEAKS

"The head and shoulders of this mountain rise a snowy cone above the purple forest robe and stand as perfectly poised as a Greek statue of marble."

proved to be sheer, though only about five hundred feet in height, rather than the thousand estimated by Stanton. The right wall was more broken and not as high as the other, but still offered no chance to climb.

The *Glen* was the first boat to navigate Separation Rapids and had a heavy tossing in the big waves where the second section beat against the left-hand cliff. Solid water appeared to roll right over the head of Dodge, who was holding on to the stern. The heavy set of current against the jutting right-hand cliff was evidently hard to pull against, but Blake kept clear by a comfortable margin. The third section, with a broad submerged rock in the middle, offered no difficulties.

As I went back to the head of the rapids to take pictures of the two canyons and other features described by Powell, the *Glen* was the only boat I saw run. Kolb went through next, and then Lint. On being told that Kolb had carried dangerously near to the right-hand cliff, I decided to take a chance at putting into the heavy water at the head of the second rapid.

The head of the second or main section of Separation Rapids is the place of which Stanton wrote: "As I looked down into that pit of fury, I wondered if it were possible for our boats to go through it and come out whole, and right side up." A few seconds after that impression was registered, Stanton was in the water and his overturned boat had a hole in it.

THE UNCAPSIZABLE "GRAND" CAPSIZES

Somehow the rapid had not looked as bad as that to me, which was unfortunate. Had I been less confident of the ability of the *Grand* to ride any waves not fanged by rocks, it would have been easy to pull to the right of the heavily running combers and fight it out with the current setting against the right-hand cliff, as the others had done. Instead, I tried only to keep the stern well on to the main line of waves on my left, and so allowed the boat to be caught quartering by a sneaking lump of a comber on the other side. An easy, effortless uplift, the flip of a foam-flecked crest at just the right instant, and the thing was done. The supposedly uncapsizable *Grand* was bottom-up.

My only mental picture of the incident has to do with La Rue's thin legs spidering against the sky as he spilled off the stern hatch, all but falling into the cockpit. Then darkness and much rolling and tumbling of water.

To keep from being cupped under the cockpit, as Kolb had been in his upset above Havasu, I let go my oars and tried to dive. In this I was materially assisted by the swirls. The several succeeding seconds were as active as unpleasant. I pawed water and gulped water, but didn't seem quite able to bring the surface down where I could use it.

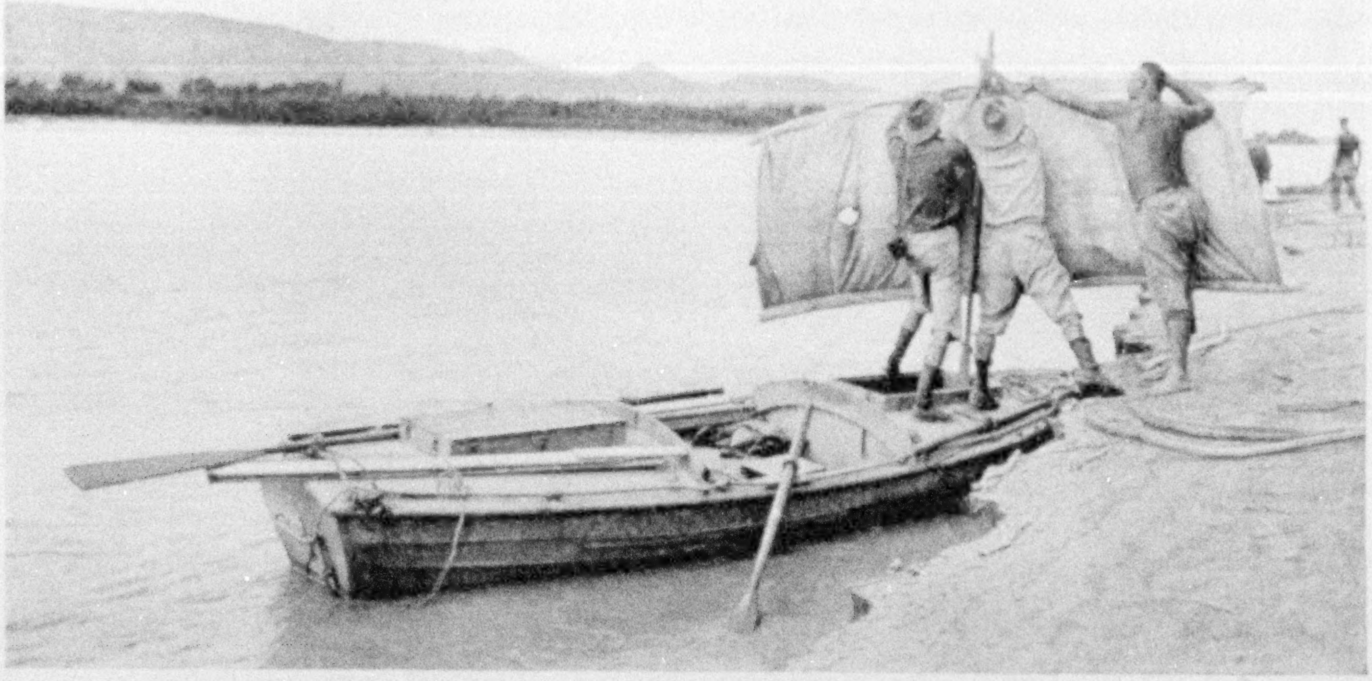
Finally a violent swirl carried me to the top, but only to suck back my protesting anatomy so quickly that the breath of air I tried to get ended in a bite of water. This time the submergence was brief, and as my head came up again I managed to gulp a lungful of mixed air and spray.

The downward pull was still strong, though intermittent, and my head continued to duck under now and then, as I lunged off after the boat, drifting 10 or 15 feet below me. I had the feeling that my saturated life-preserver jacket was giving very little support, but this may have been due to the drag of the current on my very heavy hobnailed shoes.

Moore, minus cap and glasses, was riding contentedly by one of the side ropes. La Rue was not in sight. The spectacle of the right-hand cliff seemingly about to topple over on us, as the boat was carried under it, was a bit disturbing, as one could have no illusions as to which would get the worst of it in case of a collision. The disappearance of the ominously looming wall and a throaty croak from the other side of the boat announcing that La Rue was still a passenger disposed of the chief worries of the moment.

A splash and a quickening of motion signaled the entrance to the third riffle. From above, squarely in the middle of this, the current had appeared to break in a broad, low wave over what must have been a large flat rock, fairly well submerged at the present stage. It hardly looked capable of precipitating a violent smash at the worst, yet I was glad to see our derelict giving it a wide berth to the left.

The boat danced at a merry pace on



Photograph by Lewis R. Freeman

RIGGING SAIL ON THE "GRAND" 50 MILES ABOVE NEEDLES, THE END OF THE VOYAGE

through the rest of the riffle, but not in a way to make it hard to hold on.

THE "GLEN" IS UNDAMAGED

Moore and I climbed up on the bottom of the boat as soon as it floated into quieter water, but as La Rue appeared somewhat dazed it was not practicable to attempt to right her in midstream. This was accomplished as soon as Blake and Dodge, on the *Glen*, had worked her in to an eddy against the left wall.

Baling hastily, I replaced a lost oar and pulled across to a beach on the opposite side to dry out. The little water that had entered the holds had done no harm, even to an unprotected sack of sugar. The only losses of moment were Moore's colored glasses and several irreplaceable geological specimens, loose in the cockpit at the moment of upset. My missing oar was picked up a few miles below and restored to the mate with which it had worked all the way from Lees Ferry.

Lava Cliff, the rapid considered by Stone as the worst in the whole Colorado Canyon series, was passed by intricate and laborious lining on October 11 and 12.

Burchard, the topographic engineer, who was handling the instrument in running the river line, was the victim of two bad falls the day we left Diamond Creek. In the first, when he was precipitated upon a barrel cactus with fishhook spines, he was saved from injury through the fortunate circumstance of having used the leg of a discarded boot to patch the seat of his trousers.

In the second fall he landed upon the corner of his instrument box and fractured a rib. Although in much pain at times, he stuck gamely to his work, and on October 13 was rewarded by picking up with his instrument a little pyramid of white stones on a jutting point ahead. It was the monument marking the highest point reached by his up-river survey of 1920. When the two surveys were tied in, their elevations were found to check within four feet.

There were many splashy rapids remaining below us, but none which required a preliminary reconnaissance. With the survey completed, progress was speedy. We ran out of the canyon on the first day, and on the fourth day from the Grand Wash our boats were tied up at Needles. More than 50 miles a day had been averaged where the broad, shallow river wound down through open valleys.

The party disbanded at Needles on October 20, just over three months from the date of departure from Flagstaff. The *Glen*, *Boulder*, and *Marble* were returned to the Southern California Edison Company; the *Grand* was shipped to Washington to be put on permanent exhibition at the Smithsonian Institution.

THE ISTHMUS OF TEHUANTEPEC

By Herbert Corey

Author of "Across the Equator With the American Navy," "Adventuring Down the West Coast of Mexico," "On the Monastir Road," "Along the Old Spanish Road in Mexico," etc., etc., in the National Geographic Magazine

ONCE upon a time the Isthmus of Tehuantepec was—potentially, at least—a most important neck of land. A king of Spain considered joining the Atlantic and Pacific oceans by cutting a canal through it. It was a pathway for the Argonauts who rushed to California in the golden days of '49.

Captain Eads, who built the steel arch bridge at St. Louis, won attention by his scheme to construct a ship railway over it. One can laugh at it now, for his plan was to build a multiple-tracked railroad up hills, through bogs, rounding sharp curves, on which to creak laden cargo boats on huge wheeled cradles. The largest vessels he hoped to carry would hardly class as tenders alongside the monster tramps of to-day. But at the time the world talked about it.

A treaty was negotiated between the United States and Mexico for the construction of a half railway, half canal, for the shortening of the goods route around Cape Horn, in 1850, and a commissioner was empowered to promise $30,000,000 for the right of way. This came to nothing, and after fifty years of futile effort a government-financed road was finally built, which was opened to traffic by President Porfirio Diaz in 1907.

Sir Weetman Pearson, one of the greatest of modern engineering geniuses, installed huge docks at Salina Cruz, on the Pacific coast, and Puerto Mexico, the Atlantic terminal, which are even to-day among the finest in the world.

Perhaps no railroad enterprise ever attracted wider attention. The conception was romantic and daring, for while there were no great heights to climb—on the Isthmus the cordilleras which form the backbone of the continent flatten out, so that the extreme elevation at Chivela Pass is but 730 feet—a great part of the 189 miles of road was built through a jungle which in the rainy season becomes a dangerous quagmire, where the vegetation grows so furiously that the physical existence of the road is almost imperiled.

Yankee capital by the million was poured into the various Isthmian enterprises. Bananas, pineapples, sugar cane, cotton, coconuts, almost any tropic fruit you can think of, grows while you wait. The grower's effort is not to make a crop, but to defend it against the suffocating inroads of the jungle.

Success seemed certain, for the ranches were assured of river transportation to the sea. There were rolling prairies on which cattle could be fattened and a score of valuable woods could be had for the taking. Those were days of order and prosperity.

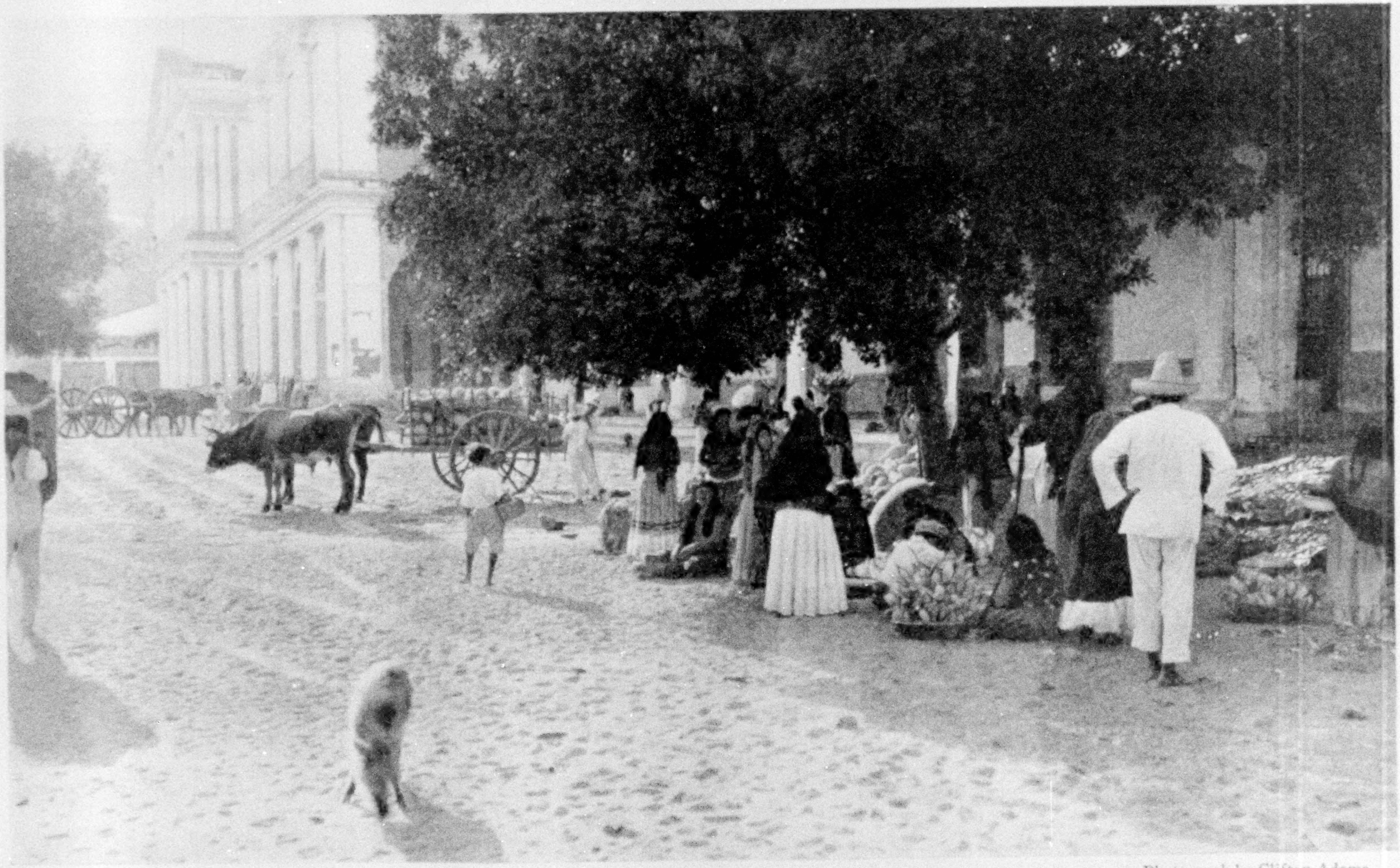
Then came the ruinous competition of the Panama Canal, followed by the Mexican revolution and the revolt of Mexican labor, and finally the World War.

RANCHES ABANDONED, DOCKS EMPTY

To-day most of the great ranches are practically abandoned. The great docks are almost empty of ships. At one time twenty freight trains ran each way each day on the trans-Isthmian railroad. To-day one mixed train, with two filthy, rackety passenger cars tacked to half a dozen half-empty freight wagons, serves what inland business there is. Sometimes the bandits interfere, and then the trains are marooned in whatever jungle island they may be.

Yet it is difficult to avoid the conviction that one of these days the Isthmus will again bustle with business. After all, the Tropics have been conquered. The English have made jungles pay in a score of places; our own experiments in the Philippines and the Panama Canal Zone have been eminently successful; France and the Netherlands have succeeded. When the world needs the Isthmus the jungle will obey orders.

One approaches the Isthmus through the city of Córdova (Cordoba) (see Map of North America, published as a supplement with this number of THE GEOGRAPHIC). There are other ways, of course. One may start from the white-



Photograph by Clifton Adams

A CORNER OF THE TEHUANTEPEC MARKET EARLY IN THE MORNING

The white building with numerous columns is the Palacio Municipal. In the foreground is one of Tehuantepec's dependable four-legged street cleaners (see text, page 555).

hot platter of Vera Cruz, sizzling on its flat shore on the Bay of Campeche, or ride six days through the mule-wide paths from the city of Oaxaca, or take steamer to either of the terminal ports of the Isthmian railway; or, having reached Guatemala, one may take the International Railway north; but the most desirable gate is that of Córdova. One is thereby assured of a pleasant memory.

We had been struggling on a narrow-gauge railway from the city of Oaxaca, going around Robin Hood's barn, stopping for repairs, listening to stories of brigands, spending nights here and there, seeing interminably an iron country of gray rock and brown sand and greenish sage.

At each little station a squad of undersized Indian soldiers crawled reluctantly from the shade and perfunctorily went through various ritual motions. Dust swept through the open windows in clouds.

Almost without warning, we came into the Tropics—warm, lush, overmastering. The air was soft and heavy; it seemed the texture of warm cream. The hills were covered by masses of verdure, laid on in thick clots, as by the sweep of an overladen brush.

LIFE IN THE PLAZA OF CÓRDOVA

"This is Córdova," said the very superior hotel runner who had captured us. He dusted his elegant boots languidly with a somewhat soiled handkerchief, summoned *cargadores* with imperious wiggles of the finger, and bowed us out of the car with elaborate courtesy.

I felt the dramatic unities could only be preserved if the orchestra crashed as we were welcomed by a group of merry villagers. The city was theatrical. One walked against a backdrop of Moorish houses whose reds and blues had been softened by the years.

That night I sat at a glistening table and looked out at the dim plaza through wide arches and drank red wine from Spain. Parrots squawked and chattered. Officers of the army entered at intervals to greet with loud cries the fortunate comrades who were already seated. They dropped their equipment with crashes by their chairs and shouted for the waiter. Pretty ladies came in and sat alone.

One does not get the full savor of Mexico until he has acquired the plaza habit. The two beggars with the guitar and mandolin began to work their way around the square, tinkling the soft, mournful airs descended to them through a complicated ancestry of Moor and Spaniard and injured Indian. A weak and homesick sentiment was induced by an environment that was rich in beauty. At each of the four corners of the little plaza rose a single royal palm, its tufted head feathering high. The air was heavy with the perfume of flowers.

Tiny electric lights sparkled starlike against the velvety blue of the heavens—a blue that was at once deep as infinity and yet so tangible that it seemed as if one might plunge one's arms in it, as in a pile of tumbled silken floss. The torch fires of Orizaba were slowly burning out overhead, as the last rays from a long-hidden sun were reflected from his snowy summit and shot through the blue pale flashes of gold and pink and a storm-cloud gray.

From somewhere near by came the sound of childish voices in song. The tune was at last identified as "London Bridge Is Falling Down," and the words were Spanish.

A bull fighter's costume, stiff with gold, gleamed in a shop window under the graceful portals.

The butchers' tramcar rattled by, with racks filled with the afternoon kill of country beef, protected by mosquito nettings. It was drawn by four mules, although Ford engines, set in pairs, furnished motive power to others of Córdova's trams.

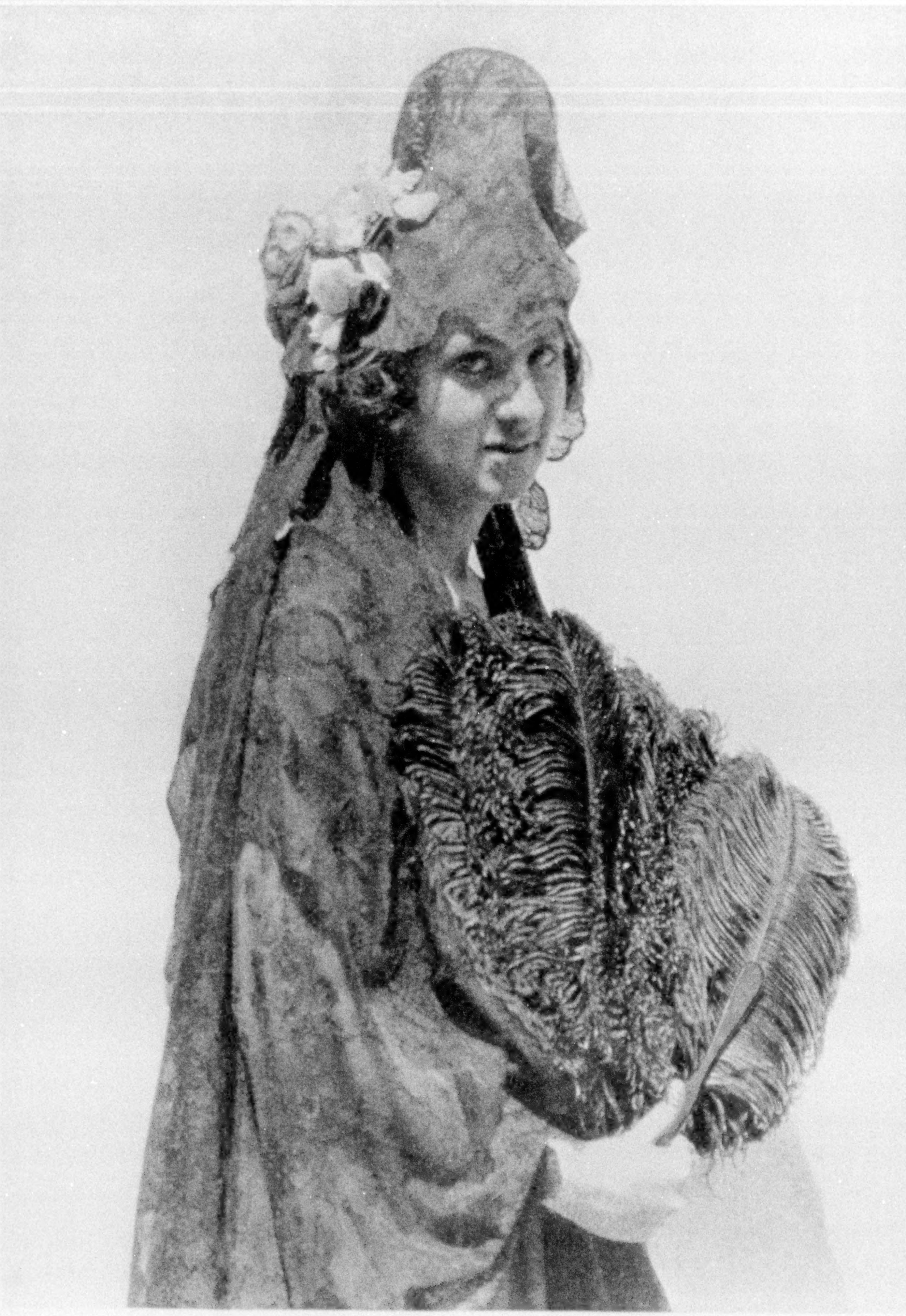
The band began to play.

There are innumerable bands in Mexico. Each town large enough to have a plaza has some sort of a band, unless the bandsmen have been killed or driven away in the war.

The Mexican band is, almost without exception, worth listening to. One wonders where it conceals itself during the days of early travail. An immature Mexican band is never heard.

COFFEE IS SERVED IN EXTRACT FORM

It was at Córdova that I abandoned the effort to have my morning eggs boiled four minutes. A Mexican egg, one eventually learns, can be and usually is fried



Photograph by Clifton Adams

A LADY OF JALAPA WITH HIGH COMB, MANTILLA, AND ABANICO (FAN)

The population of the Isthmus of Tehuantepec remains predominantly Indian, but on the central plateau, where climatic conditions have been favorable, there are many inhabitants of pure Spanish stock who possess the grace and charm of old Castile.

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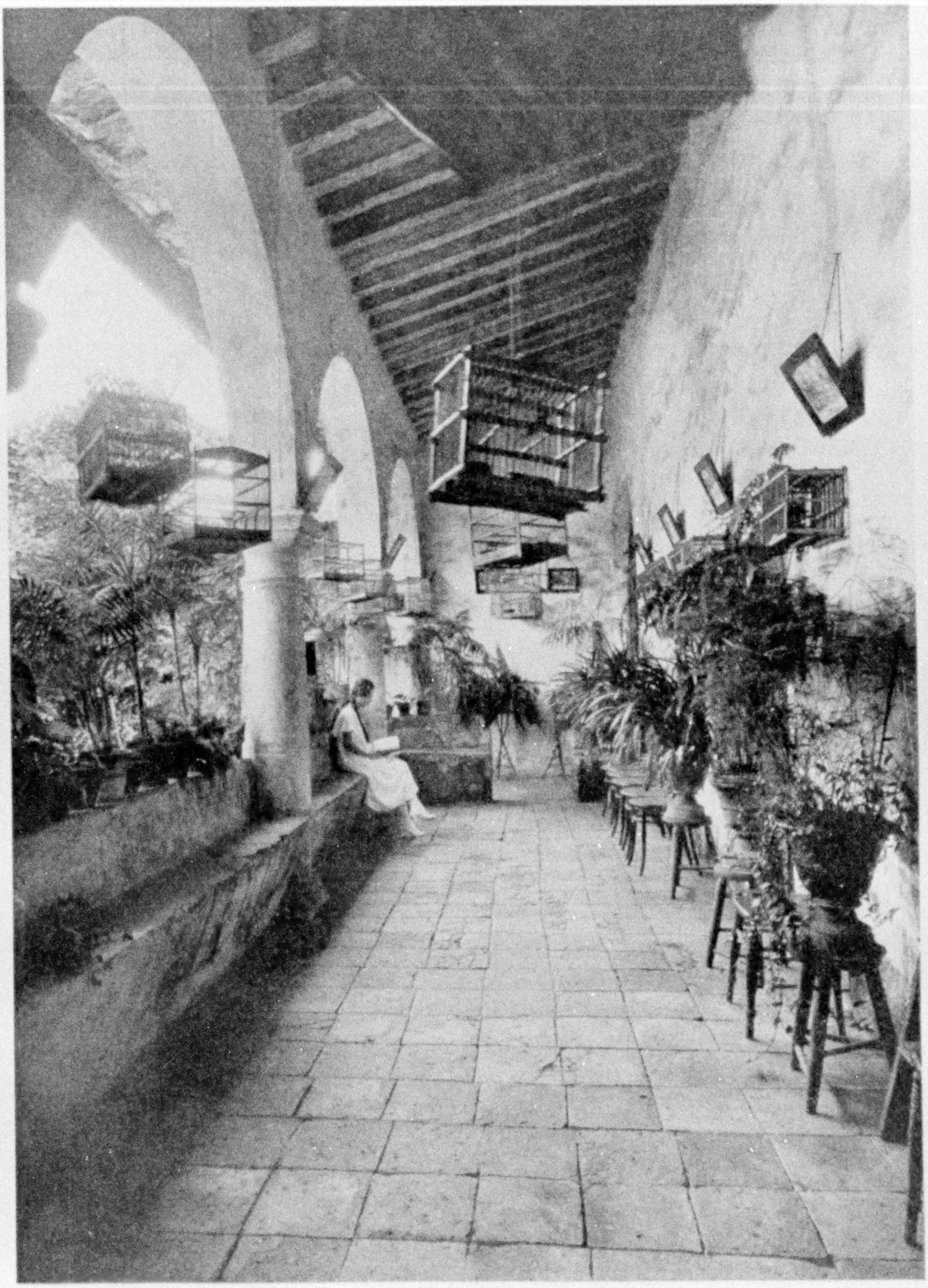
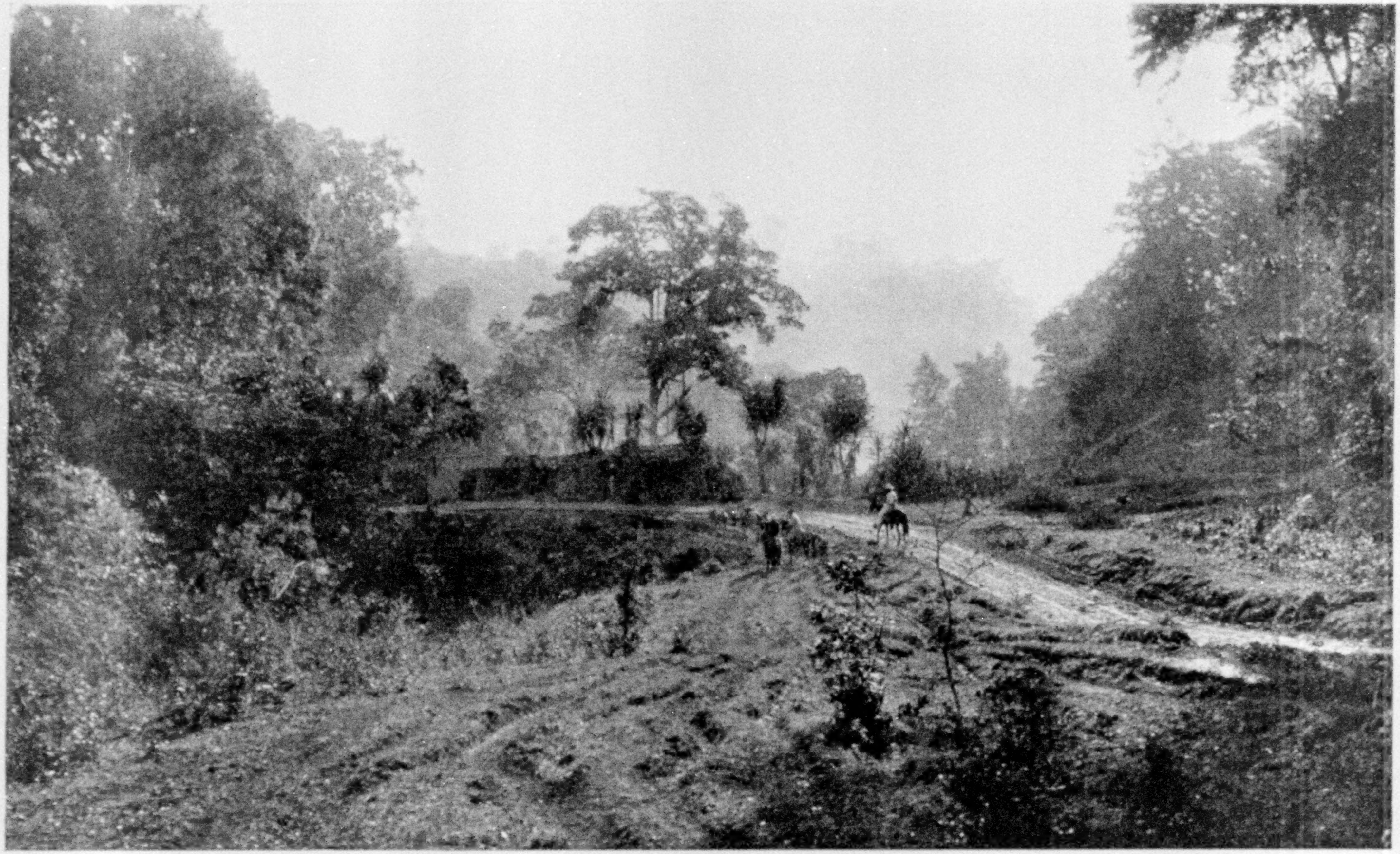


Photograph by Clifton Adams

IN THE PATIO OF A JALAPA HOME

Jalapa, connected by rail with Vera Cruz, lies to the north of the Isthmus of Tehuantepec. Beautifully situated 4,400 feet above the sea, it is one of the most favored of the summer resorts of Mexico.



Photograph by Clifton Adams

EARLY MORNING ON A TRAIL IN THE MOUNTAINS ABOVE JALAPA

When Cortez, with his little band of Spaniards, climbed to the thriving Indian village of Jalapa, which has now grown into the busy capital of the State of Vera Cruz, with 20,000 inhabitants, he enjoyed one of the most beautiful views the country affords. Mount Orizaba, in its white robes, looms up to the south; the Sierra Madre, with its dark groves of pines, to the west, and below are the meadows of the lowlands.

very hard, so that as an item of the meal its durability compels respect. Hard-boiled eggs can be had of the street venders at every curb. There are various phrases for use by the person who wishes his eggs boiled to a bland medium, but no matter how one may vary the form of the order, one's eggs are always *tibio,* which means lukewarm, and the twin elements can readily be imbibed through a straw.

I had descended to the hotel office in search of coffee with which to gild the dawn. A peon or two slept on the wide, dusty floor, in front of the great doors, open to the fresh morning air. The miracle of Orizaba could be seen hovering in the heavens, a shimmering filament of pearl. One began to understand how those who live in the shadow of such beauty have it unconsciously in mind at all times. The vacant-minded peons sit by the hour in the street of Córdova and watch that glittering peak (see page 558).

"*Hay* coffee?" I asked the hotel clerk.

The inquiry was tactless, but at such an hour one can not be a Raleigh to order. He was leaning across the counter, listening to a radiant little creature in a short green dress. I made careful notes of her costume, as I sat grumpily at a table. Her stockings were silk and white, her shoe heels very slender and very high, and a *rebosa* of figured red silk was looped about her graceful head. A tortoise-shell comb, big as a dinner plate, was thrust in her purplish-black hair. She went through the motion of whipping out a knife and thrusting it at the midriff of the fascinated clerk and shouted "Hah!"

"*Si,*" said the clerk, "the coffee." He exchanged patient smiles with the flashing señorita at the desk.

In the midst of the raffle of catsup bottles and sugar bowls and salt shakers was a great bottle, filled with the blackest extract of coffee. In the hotter parts of Mexico coffee is boiled down to a midnight essence and bottled. One then mixes it with warm milk to please one's own palate, and is thereby faintly assured that one detachment of the army of germs one suspects lurks around every gastronomic corner has been circumvented.

The number of dietary taboos one discovers in tropical Mexico is alarming. Pork, no matter how well cooked, may be a poison to the Gringo, for the food of the ravening pigs consists in great part of the filth made available by Indians, who have not the faintest ideas of sanitation. Beef must be cooked to an oaken dryness before it is safe.

In front of the hotel at this hour passed a procession of laden burros. Men rode to the day's work on snappy little horses, and pack animals ambled in half buried under mountainous loads of green and rustling cane. The cargadores yawned, as they squatted along the wall under the first warm rays of the sun.

The women here seemed clean and well dressed and modestly self-possessed. One suspects more than a dash of African blood in Córdova, and the vigor and independence of these women are probably due to the comparative prosperity of the town. Córdova is in the heart of the coffee district of Mexico, and while farming has been interfered with, as has everything everywhere by the revolutionary excesses of the last decade, the coffee farmers seem to have suffered least.

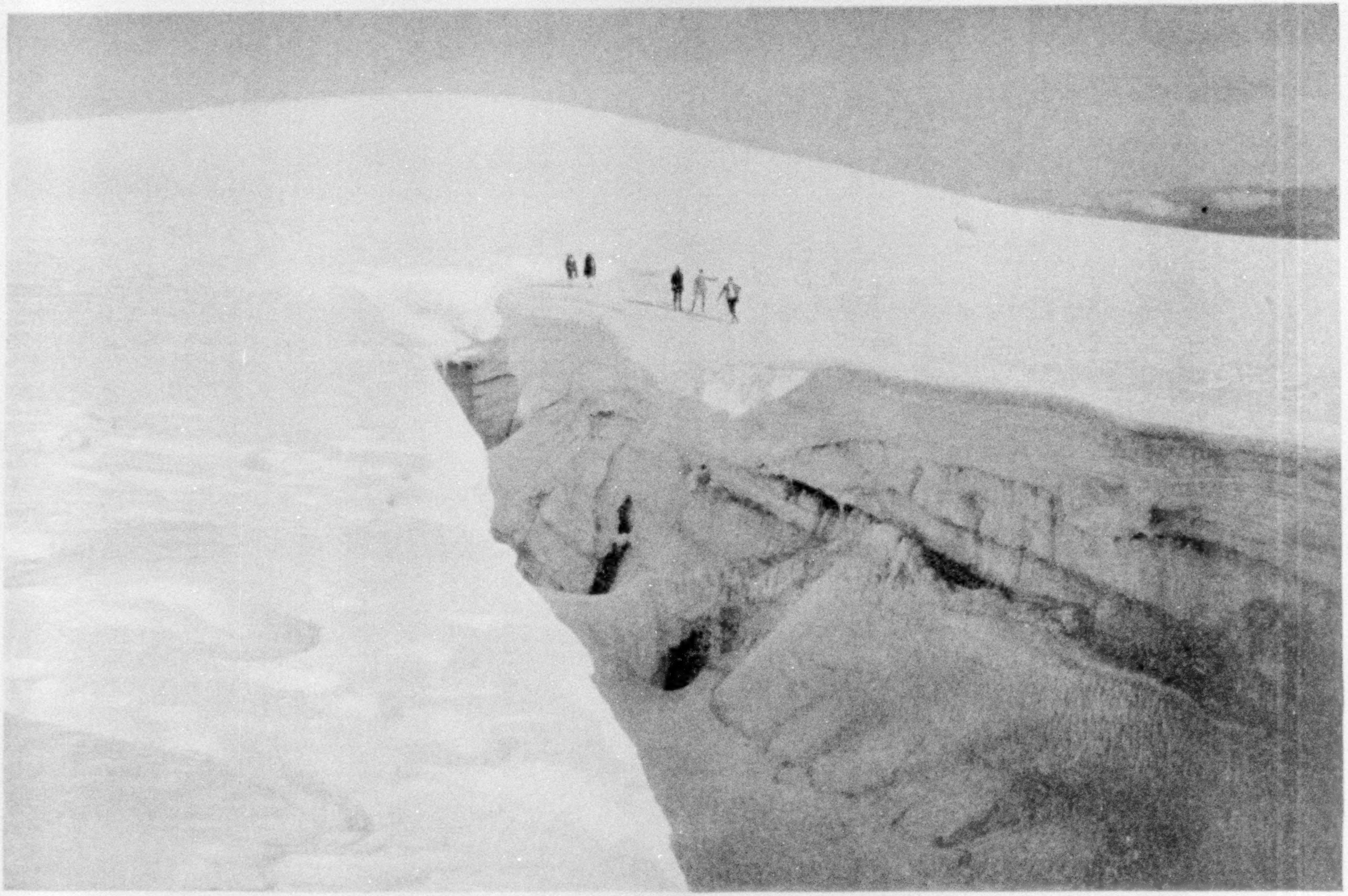
RAILROAD TRAVEL ON THE ISTHMUS IS AN ORDEAL

The Isthmus of Tehuantepec is shared in about equal parts by the States of Vera Cruz and Oaxaca. It runs east and west, which does not agree with one's half-forgotten memories of the map, and the trans-Isthmian railroad crosses it from north to south.

That part of the Mexican territory included in the Isthmus proper is, perhaps, 200 miles east and west by 150 miles transversely. The greater part of it is wet, heavy, almost impenetrable jungle, although on the Pacific coast there are lands on which rain hardly falls at all.

One of the National railways forms a Y, with the points at Vera Cruz and Córdova and the intersection at Tierra Blanca, to connect with the trans-Isthmian road at Santa Lucrecia.

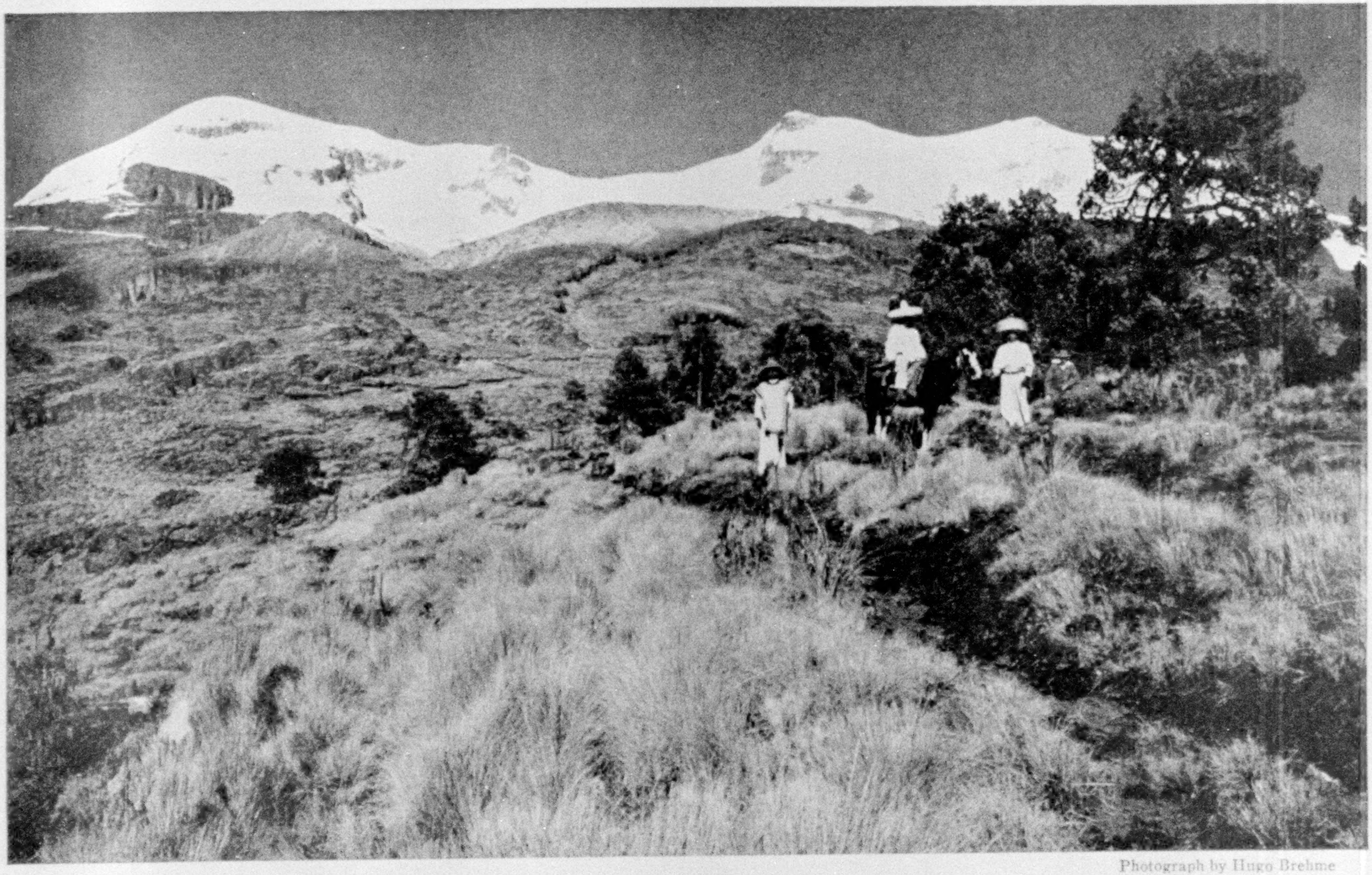
The ruin of the Isthmus began to be apparent even before we had taken our seats in the ramshackle little car for Tierra Blanca. The architects of the station at Córdova had had progressive ideas,



Photograph by Hugo Brehme

A CREVASSE IN THE SNOW FIELDS ON IZTACCIHUATL

The summit of the mountain, which is known geologically as the ruins of a volcano, consists of three elevations covered in pure white snow perhaps three acres in extent. It is not difficult of ascent and is usually scaled along the south arete from the pass facing Popocatepetl.



Photograph by Hugo Brehme

VEGETATION ON THE SLOPES OF IZTACCIHUATL (SLEEPING WOMAN)

The mountain derives its name from a fancied resemblance to a recumbent female figure. It is linked to Popocatepetl by a deeply curved saddle, over which Cortez built a military road in order that he might advance in 1519 to the conquest of the Valley of Mexico. It wears a cap of eternal snow extending 2,000 feet below its crest, which is 17,323 feet above sea level.

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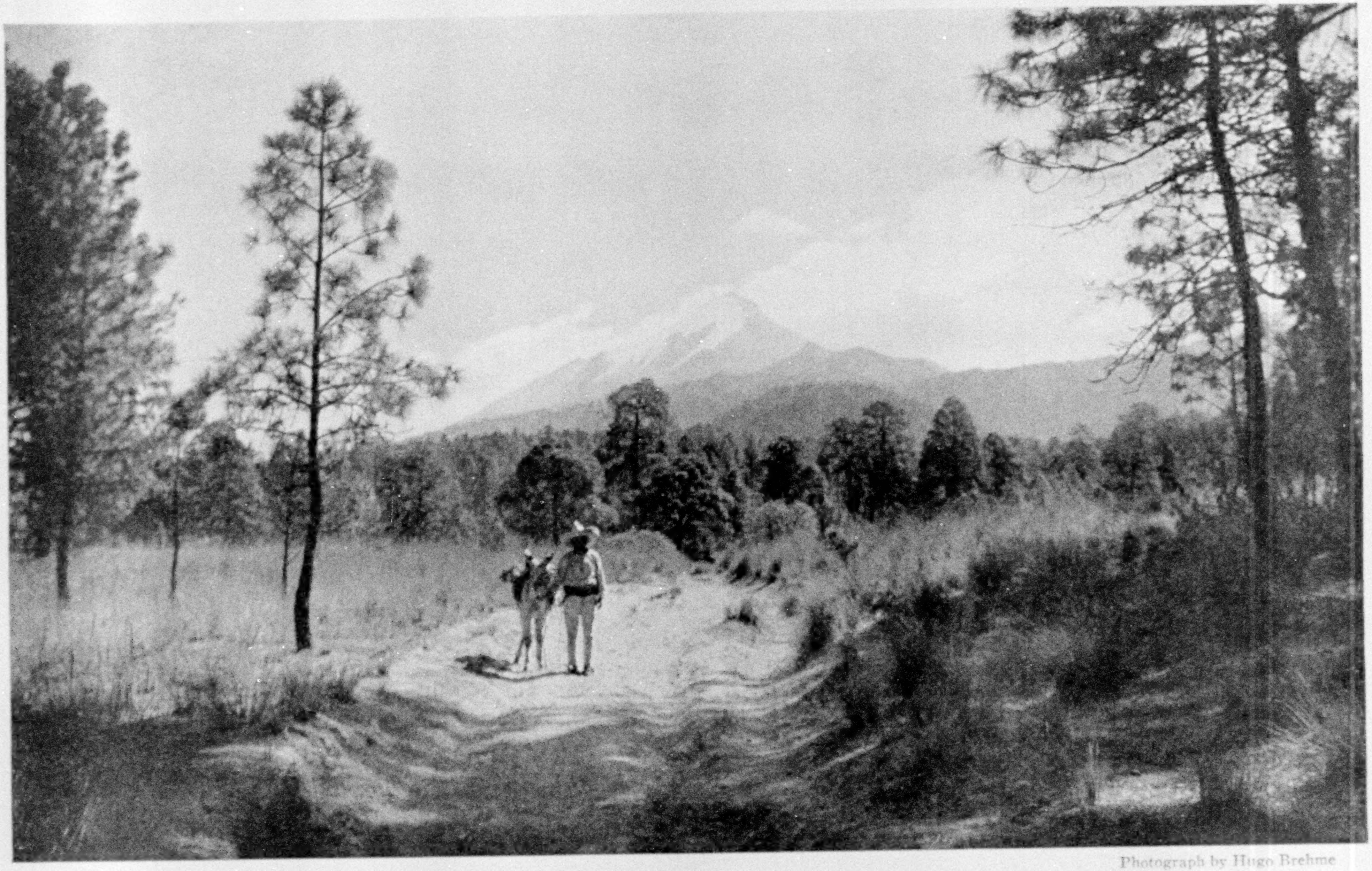


Photograph by Hugo Brehme

ON THE ROAD TO THE PEAK OF ORIZABA, KNOWN TO THE INDIANS AS CITLALTEPETL (MOUNTAIN OF THE STAR)

This volcano, the second highest peak in North America, lifts its crest more than 18,000 feet above sea level. One writer has said, "Orizaba has what mortals rarely possess united—a warm heart, with a clear, cold head!" Though the mountain is not very accessible, American officers of General Winfield Scott's army scaled it and planted a flag on its summit in 1848. Long quiescent, Orizaba was reported in eruption two months ago.

but nowadays one approaches it by pig-encumbered paths through the mud. The status of the pair of daily trains, one of which arrives at night and the other departs in the morning, was set forth on a blackboard. Their lateness varied by hours.

The first-class coach had been a box car in happier days. It had been converted to the uses of the passenger traffic department by cutting square holes to serve as windows, and carpentering-in small, perpendicular slat seats, which were disappointingly cushioned in black oilcloth.

Some of the train guard rode on the roof and some on the rear platform, armed with rusty rifles of various makes.

THE JUNGLE A TANGLE WHERE REPTILES LIVE HAPPY LIVES

When we came to the jungle I was not tempted to enter it. It was thick, tangled, two-storied, where the comparatively delicate plants, unable to live in the sunless cavern at the earth's surface, had mounted to the upper branches of the rioting trees.

Under foot was a swamp, penetrated with streams of muddy, stagnant water in which various reptiles lived happy lives. Palms, wild bananas, bamboos, knotty, twisted trees of a dozen sorts, were underlaid with matted growth.

The natives carried their machetes swung to the shoulder, and one saw them chopping their way along the narrow paths, worn smooth by slapping native bare feet, into the profundities of the jungle.

But for the first half day's ride we passed through a country of unbelievable fertility. The cultivated lands were of a uniformly red tint, which glowed against the heavy green of the vegetation.

We rode for miles through plantations of pineapples and plantains and sugar cane. The broad, glossy green leaves of the coffee bushes shone between the rows of huge banana plants, where they had been set for protection from the sun.

In front of the roadside haciendas were wide cement floors, on which at harvest time the coffee berries were spread to dry. Between times they offered convenient playgrounds for the wandering pigs. Tinkling streams dashed down the mountains and under arched bridges.

The newcomer first sees in this land the wasted opportunities. Enough foodstuffs might be produced on the Isthmus to feed the entire Republic, which now imports a large part of its food. The land is as fat as an Illinois river bottom, and the procession of rain and sun forces vegetation hothouse fashion.

The primal curse has been almost lifted here. A native who wishes to raise a crop of corn needs only burn off a patch of grass and drop the seed in holes made by a pointed stick. He never dreams of cultivating or weeding it. Next year he burns off another patch. His hens rustle for themselves and his pigs live a discontented but earnest existence, at their own cost. His greatest activity is to move from a patch of sunlight into a cooling area of shade.

We discovered that life in a tropical jungle is a constant battle against foes that we fortunates of the north have never heard of. The right of way of the railroad is only kept clear of encroaching vines by an alternate process of burning and mowing and soaking with boiling chemical solutions. Seeds blown by the winds find lodgment in the crevices of stone walls, and in a few years a well-built house looks like a relic of the Spanish invasion, so thoroughly has it been torn apart.

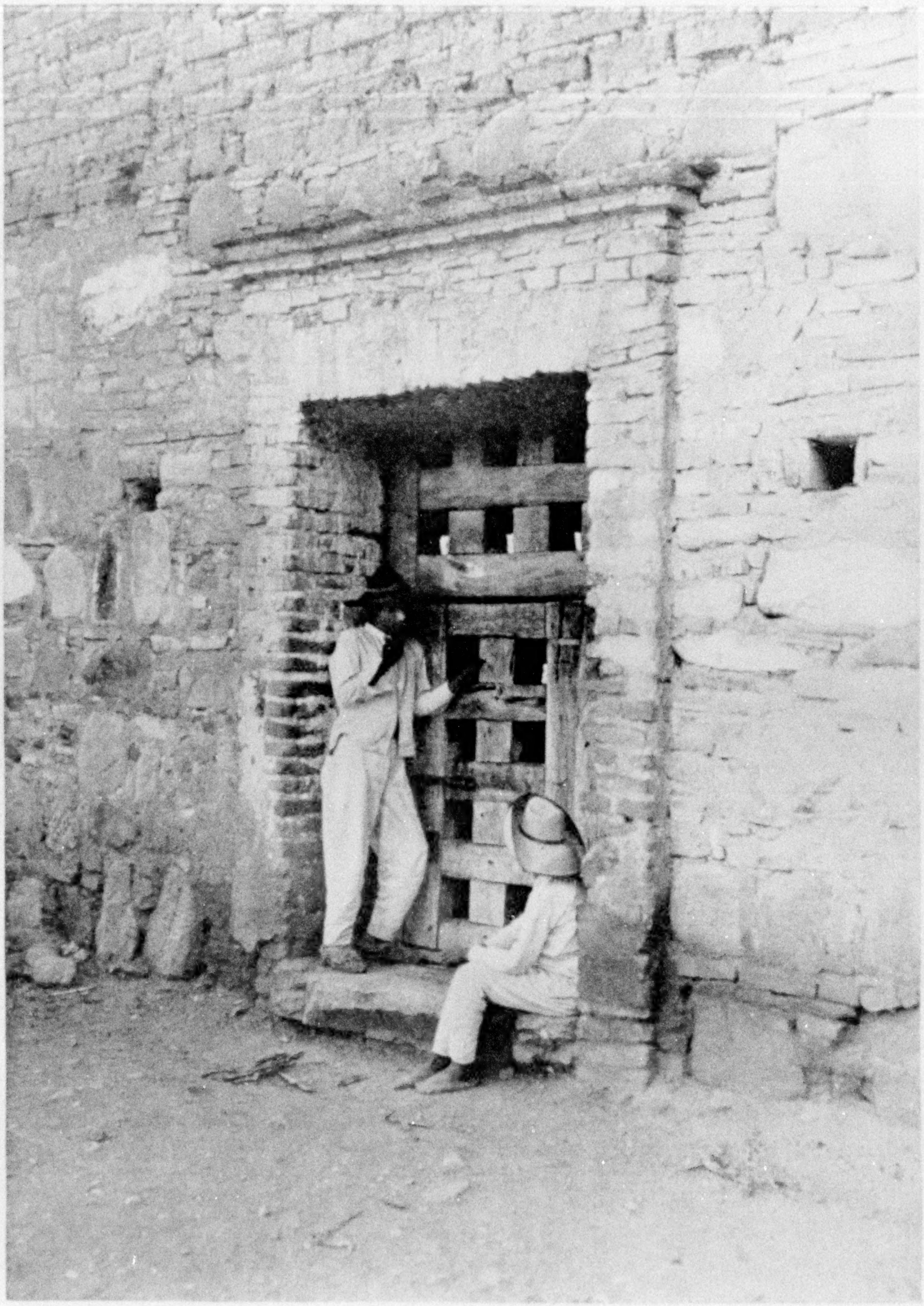
Fevers and agues and insect foes are everywhere.

There is the hookworm, of course, which accounts for some of the lassitude of the people, and the screw worm, which bores into one's flesh, and keeps on boring after it reaches the bone. This is the home of the "chigger," which makes a hive of its host and produces ulcers.

There are flying pests which poison the flesh if they but light on one, and enormous ants and little red bugs which come up from below and produce a fiery irritation. Flies settle in masses, and at night mosquitoes plague, and a devilish little flea abounds, and gnats swarm in one's eyes.

MOUNDS MARK SITES OF BURIED CITIES

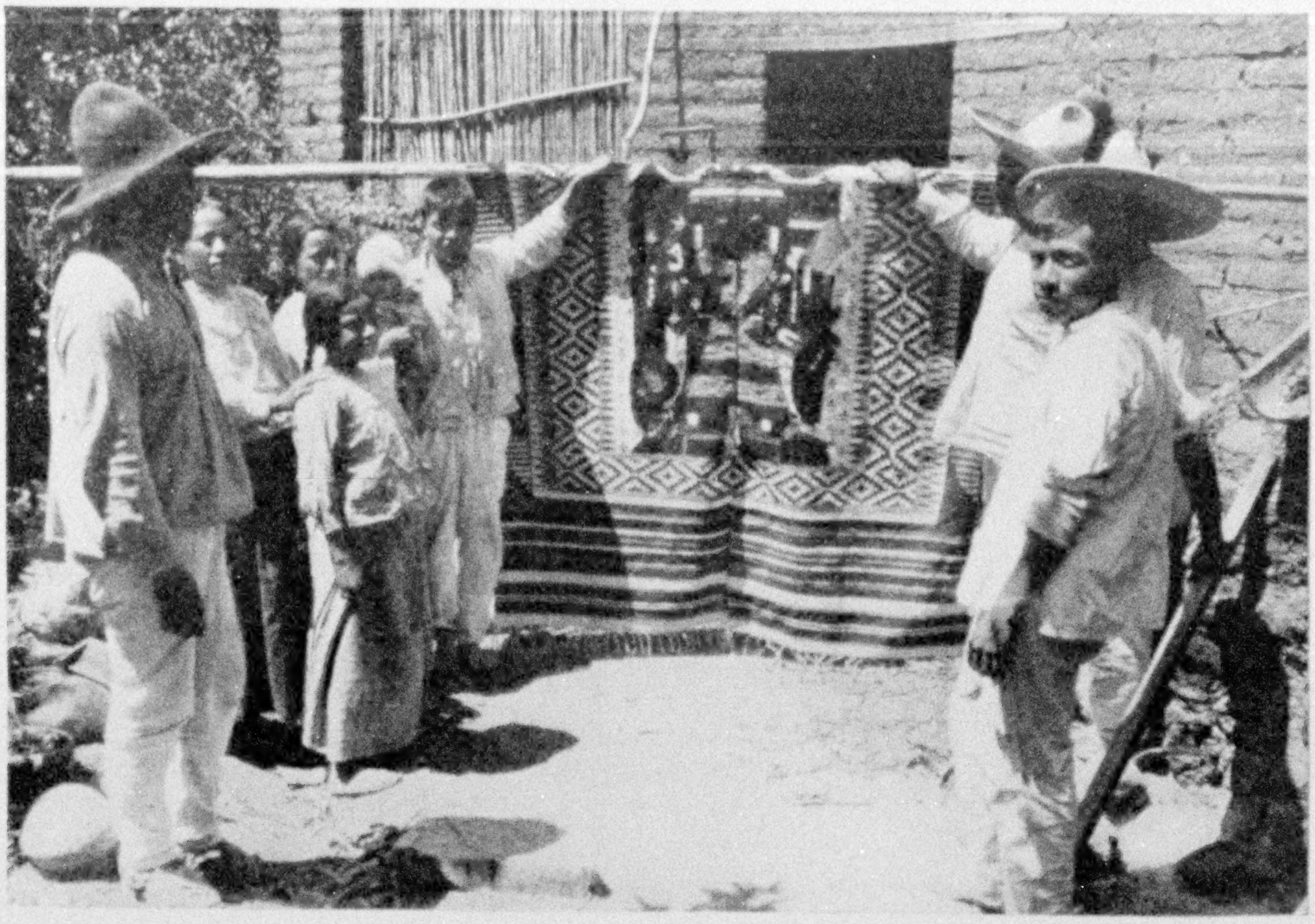
We rode through wide pampas on which a few cattle stood horn-deep in



Photograph by Clifton Adams

THE "CÁRCEL," OR JAIL, IN A VILLAGE OF OAXACA

The men on the outside of the door, constructed of heavy beams, are visiting the offenders, who have been guilty of drinking too much pulque, a fermented beverage made from the juice of the agave. The Isthmus of Tehuantepec lies partly in the State of Oaxaca and partly in that of Vera Cruz.



Photograph by Clifton Adams

AN INDIAN FAMILY IN AN OAXACA VILLAGE SHOWING THE FAVORITE FAMILY SERAPE DESIGN

These designs often represent some of the better known of the ancient Aztec gods and are incorporated in the weave of the serape in all colors of the rainbow.

grass, as fat as butter. Not far away is the National Valley, in which the best tobacco in Mexico is produced.

In the distance were shapeless mounds which are the remains of buried cities. Beyond doubt this fecund land once maintained an immense population. Even at the time the Spaniards came, it was prosperous and populous, although it seems to have been decaying slowly ever since. Seventy-five years ago there were towns where there are now only memories.

In the reports of the engineers who laid out the schemes for the interocean transportation ways, one reads of great herds of cattle and of large estates. They have been almost swallowed up by the jungle.

As the train rattled south toward the Isthmus proper, clacking at every loose joint in the rails that bent under it on rotting sleepers, a likeness to an African landscape appeared. The houses became conical huts with roofs thatched with palm leaves, Congo fashion.

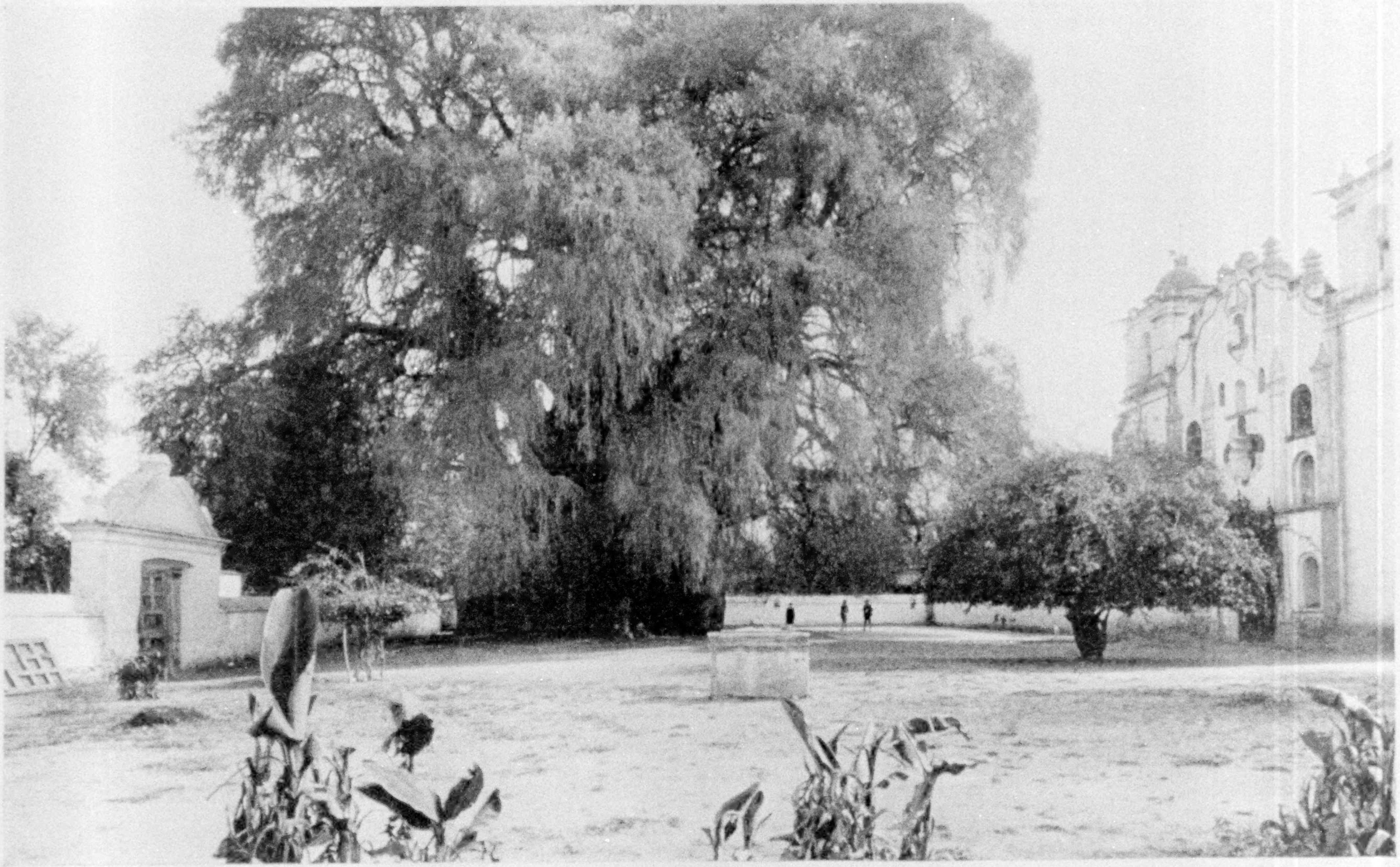
Palms rose among the reeds on the banks of the River Papaloápam (Sto. Domingo), one hundred yards wide, on whose swift current little whirlpools swirled and disappeared. High-prowed dugouts were paddled by half-naked men. This river is navigable for light-draft steamboats, but there was no business for them at the time of our visit.

Fruits of every tropical sort were offered at the wayside stops. The routine of papayas, mangoes, chirimoyas, was varied by slices of small greenish-white and almost tasteless watermelon.

One wondered why the train stopped at the stations, for nothing was taken on or put off.

SANTA LUCRECIA IS BUSTLING ONLY BY CONTRAST

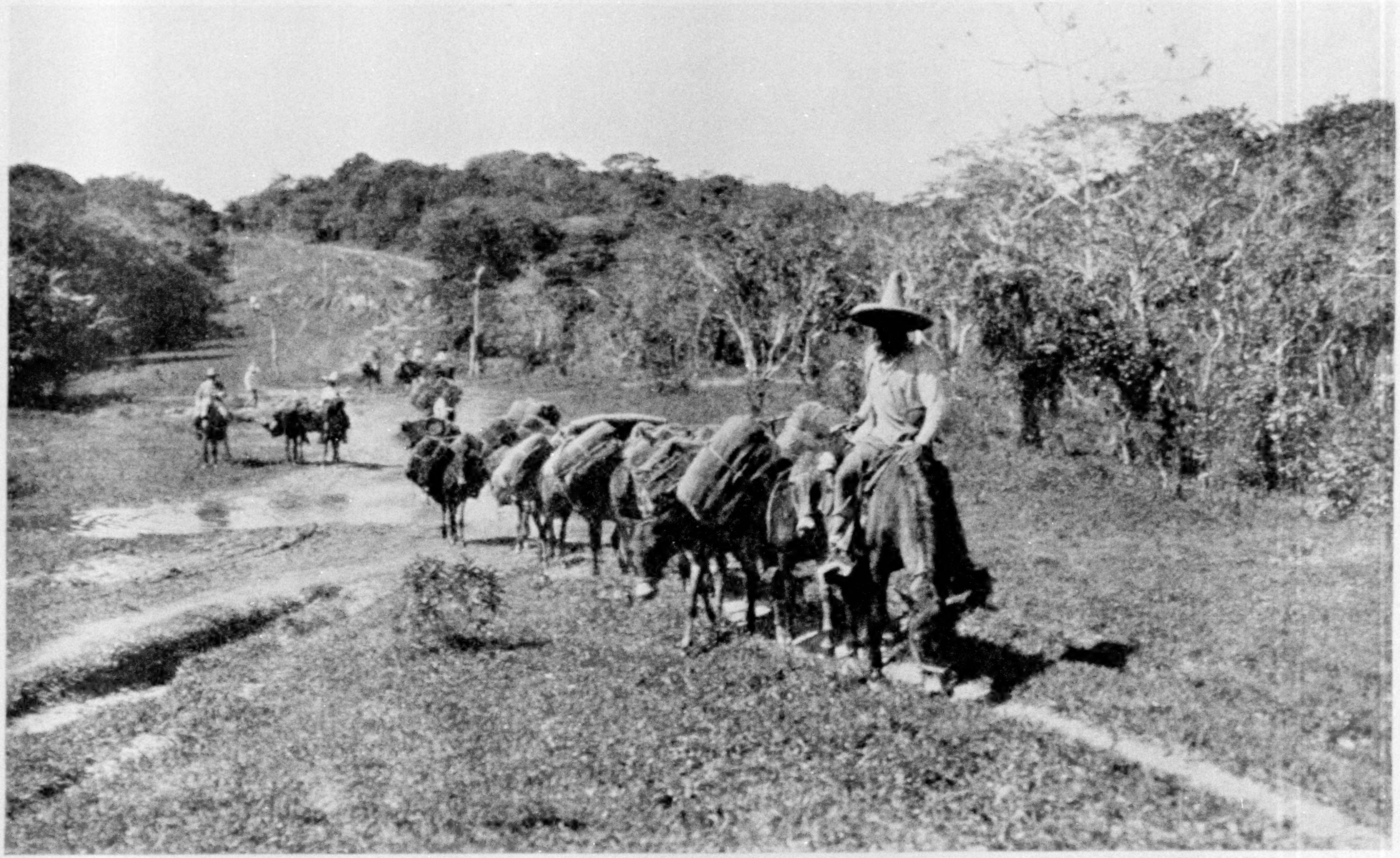
The ride was almost monotonous until we reached the station of Santa Lucrecia. One can not keep one's interest alive in a solid wall of green, varied only by pools of stagnant and miasmatic water. It is true there were a few sugar mills, idle for the most part, and at El Burro a



Photograph by Clifton Adams

THE CHURCHYARD OF SANTA MARÍA DEL TULE AND ITS FAMOUS CYPRESS

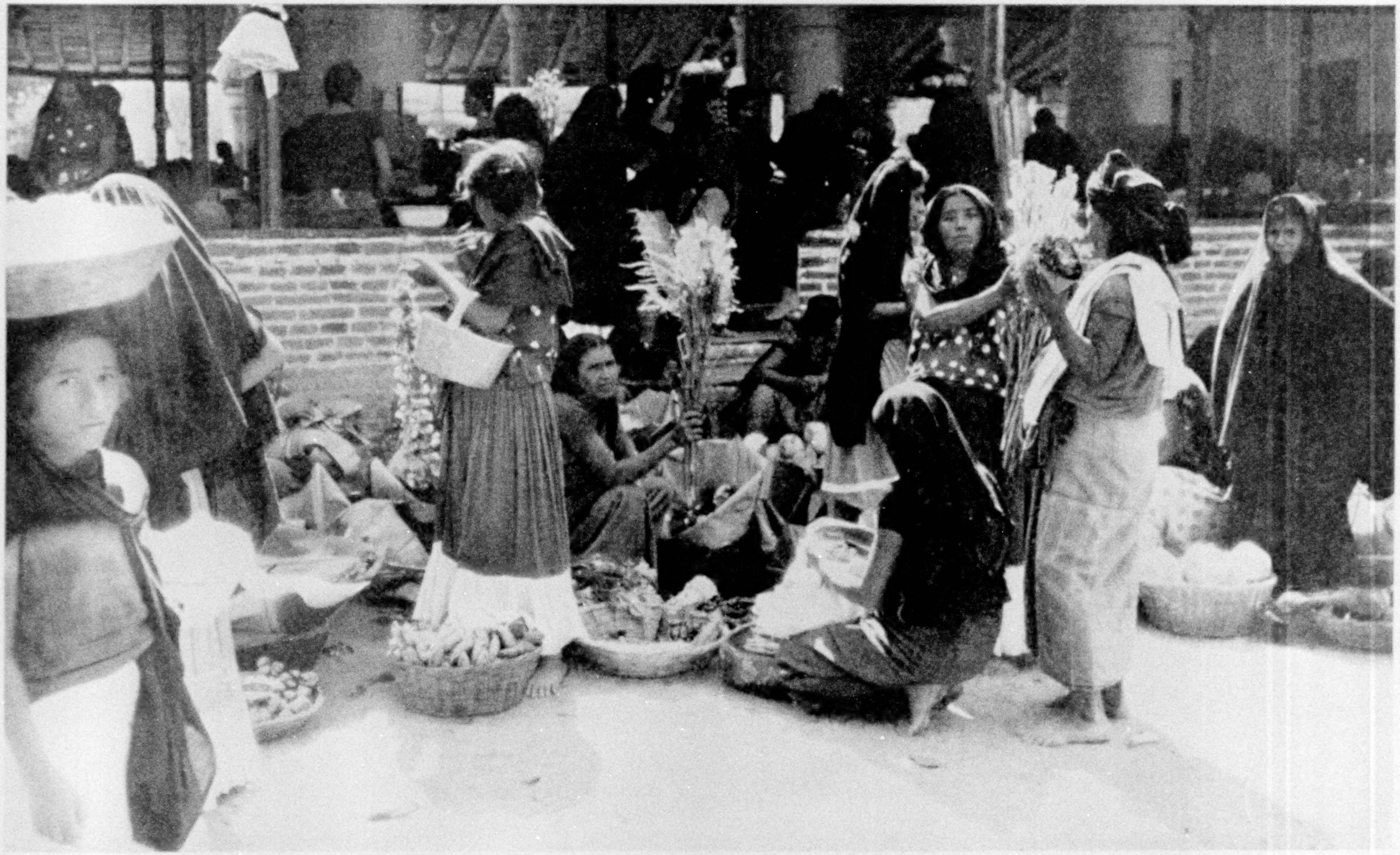
Not far from the city of Oaxaca stands a tree of the cypress family 160 feet high and measuring 160 feet in circumference four feet from the ground. Legend says it sheltered Hernando Cortez and his troops en route to the conquest of Honduras four centuries ago. Baron von Humboldt, the naturalist, was so impressed by this giant tree that he inscribed his name on the trunk, part of the inscription being visible to-day.



Photograph from Harriet Chalmers Adams

A PACK TRAIN ON THE ISTHMUS OF TEHUANTEPEC

Most of the hauling in this part of Mexico is done on primitive carts drawn by oxen while trains of heavily-laden burros provide the chief means of freight transport where trails take the place of roads.



Photograph by Clifton Adams

THE FLOWER STALL IN THE MARKET OF TEHUANTEPEC

Many of the Tehuana women are adept at weaving chains and wreaths of jasmine blossoms. Small holdings on the outskirts of Tehuantepec are devoted exclusively to the growing of flowers and on Sundays and Thursdays the fragrant market is riotous with color.

peon slept with the dogs under the stand on which the local butcher displayed some strings of thin, yellowish meat, his head pillowed on the raw skull of an ox.

Unclean soldiers squatted with the pigs under the houses, raised Malay-fashion on piles against the annual inundation.

At some of the banana plantations were octagonal watchtowers, solidly built of stone, which served as shelters against the bandits or patriotas or whatever other human plague might be current.

Placards on the stations warned against carrying arms. There had been too much shooting and cow-killing.

By contrast, the little station of Santa Lucrecia fairly bustled. Here was a hotel in which one might sleep in a room that had been swept out at intervals. The sheets were almost clean, although there were ominous brown spots on the dirty walls. The wallow in which the hotel refuse was thrown and which was frequented in dispassionate comradeship by the pigs and buzzards was fully forty feet away. A peripatetic barber labored in his vocation under the roof of the waiting shed, where Indians slept in the dust.

KINDLY MEXICAN INDIANS BEFRIEND AMERICAN TRAMPS

There were other houses—a dozen, perhaps—and other hotels set on piles over a solid carpet of snoring pigs. There were American railroad "stiffs," as there were at every other junction point in Mexico.

"We are on our way from Guatemala," they said, "and we are hungry for ham and eggs."

Surely no poverty-stricken people in the world are more kindly than the Mexican Indians. With no reason whatever to be kind to white folks, the destitute wanderer never appeals to them in vain. The railroad "stiffs" had been making their way a station at a time. At each stop they would be thrown off the train, and when the next day's train came along they got back on again. Between times they lived on the Indians.

Here the Coatzacoalcos River (River of the Winding Snake), the largest on the Isthmus, offers water transport to the Atlantic coast. In the shallow water near shore sat naked women, scrubbing their brown bodies with sand. Two pretty washerwomen had erected a brush-roofed stand near the water, under which they had propped, waist high, great tubs hewn from logs.

A handsome, slender woman in black asked for gold pieces.

"I will buy them," she said. "I want them for my necklace."

The Isthmian native does not regard work as the chief end of man. When a livelihood can be picked up so easily, he feels no call to toil. Now and then he is stirred by ambition and works until he gets a new knife or a new sombrero, but a steady job has no attraction for him. High wages mean nothing to him, and the Americans who thought to make him joyless and self-respecting by thirty days' work a month have changed their plans.

Because piecework is the only way in which Indian labor can be handled, the Americans were forced to keep several times as many laborers as they needed.

Sometimes there is a brief flash of hope. A lover goes to work to buy his best girl a silk handkerchief or a ring. The girl becomes the object of neighborly envy, and the other girls work in order to get money to buy gauds that will cast a dense shadow over the first girl. She works for a time to maintain her supremacy.

"But by and by," say the employers, "they all get shoes or brass rings or handkerchiefs; or else they get married or get tired."

WHERE THE FORTY-NINERS CROSSED

Suddenly we left the jungle. On one side of a rocky ravine it dripped and breathed and rotted. On the other we were already on the dry hills.

The road ran through a rolling country, dotted with clumps of tangled brush and clothed with gama grass, on which a few cattle grazed. In the distance the blue hills were covered with marketable timber. There were tunnels and cuts in the cliffs, and salt-water breezes put life in the air.

On the front of a well-built station, lonely in the hills, where half a dozen bare-belted Indian women offered cold boiled ears of corn to the hungry, was the name Sarabia. Here the Forty-niners left their canoes to tramp overland for the Pacific coast. The river itself was a little

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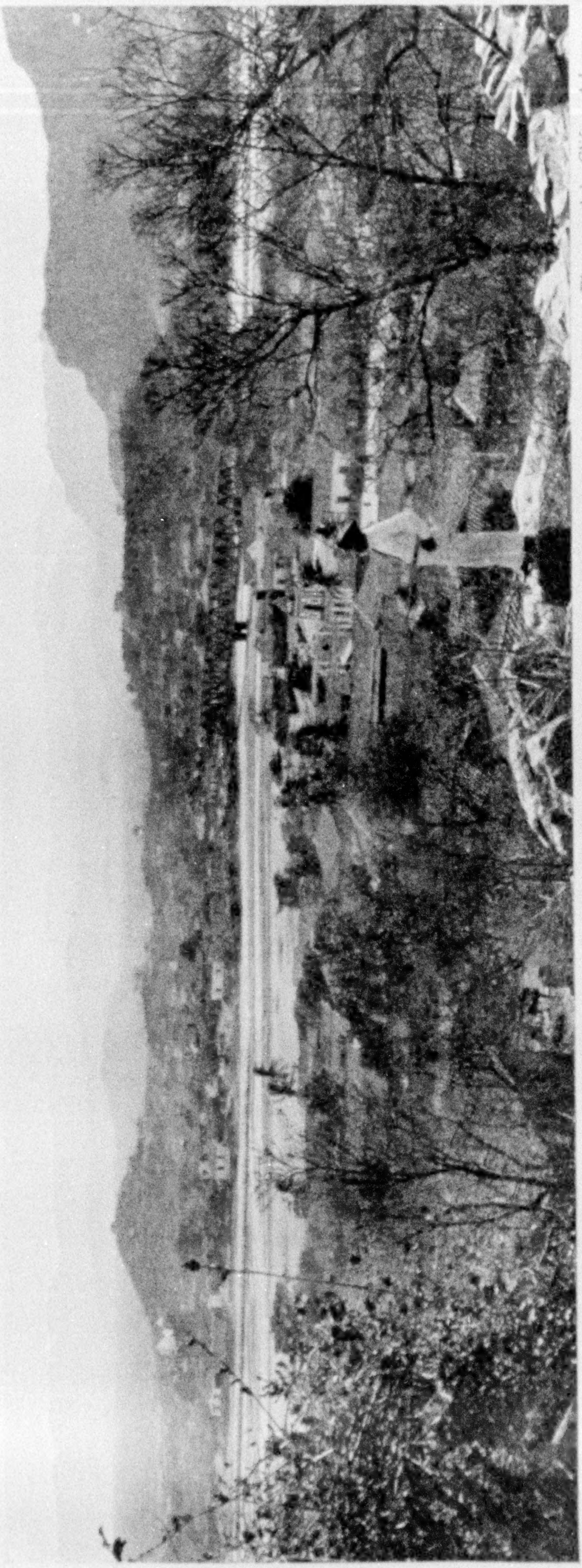


Photograph by Clifton Adams

THE TOWN OF TEHUANTEPEC AND THE VALLEY OF THE TEHUANTEPEC RIVER, 21 MILES NORTHWEST OF SALINA CRUZ, ON THE PACIFIC

The statement that the highest point on the Tehuantepec route is nearly 730 feet gives little idea of the engineering difficulties. The Pacific slope of the continental divide is so sharp that a series of reverse curves and tobogganlike inclines makes the road so crooked that it has been said "the brakeman on the caboose could light his cigar from the headlight of the locomotive."

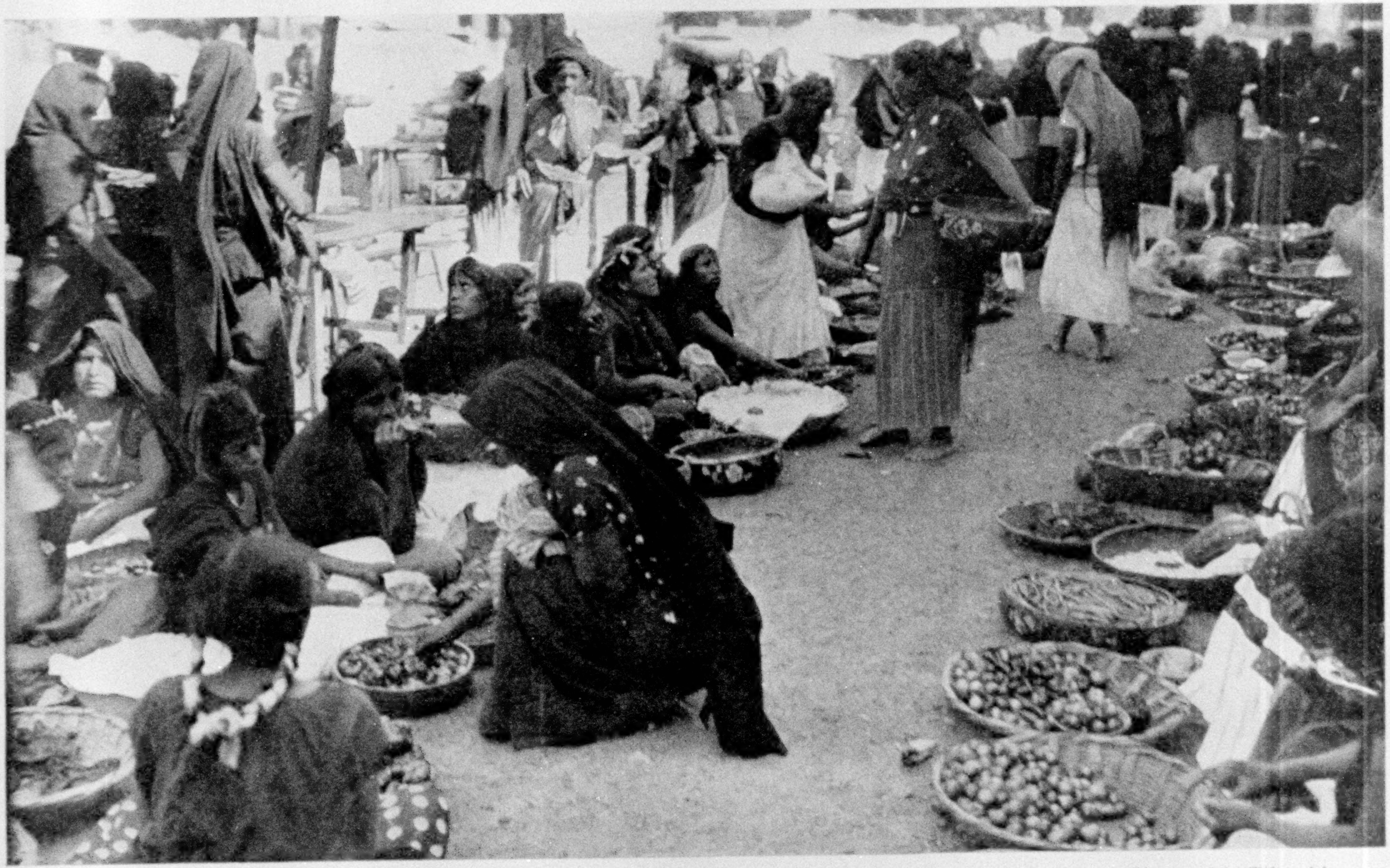
one, hardly fifty feet wide and perhaps knee-deep. One could see the rocks of the bottom through the clear water. For miles the Forty-niners walked in it and pushed their canoes.

Our spirits dropped at Rincón Antonio. This had once been a well-built village of burned brick, where were the headquarters of the railroad officials, away from the steamy heats of the two oceans. Once there had been railroad shops and commodious yards.

The long row of brick houses in which the officials of the road had once lived, with their families, now sheltered Indian workmen, Indian fashion. Decrepit, rusty, unkempt cars and engines were scattered through the almost empty yards. The man who shared my seat had lived in that very row during the good times.

"It seems impossible," he said. "Then it was such a lively, clean, snappy town. There were American women and children and a bright, attractive club, and music and sports. Now it is slipping back toward the status of an Indian pueblo."

An American stood on the platform of the little station of the City of the Beautiful Women. There was nothing particularly



Photograph by Clifton Adams

THE FRUIT MARKET OF TEHUANTEPEC

Almost every sort of tropical fruit is to be had here. Beneath a great tiled roof, supported by immense pillars of masonry, pineapples, chicos, coconuts, oranges, lemons, and mangoes are piled high in hampers.

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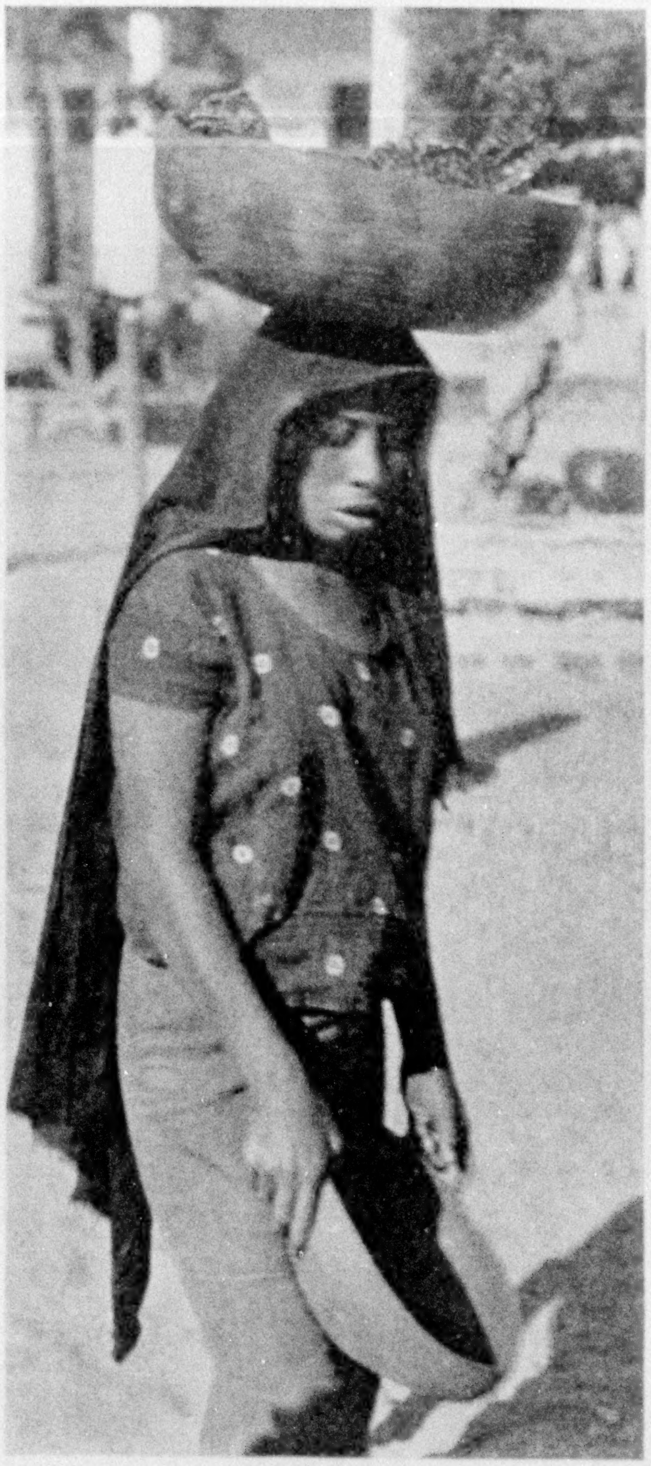


Photograph by Clifton Adams

CARRYING A CHICKEN HOME FROM MARKET

significant or even interesting in that. One sees them wherever one goes through this country—khaki breeches, O D shirt, Stetson hat, hands in pockets. If the American wears a coat, he may have a gun tucked away under the left arm. As a rule, they go unarmed; for, as one explained:

"If you have a gun, the chances are you can't get at it in time. The other fellow will shoot you from behind; also, if you have a gun, some local capitano will take it away for his own use and fine you into the bargain."

They scout through the country on all sorts of errands. Sometimes they have salaries and expense accounts and sometimes just curiosity and appetite. Sometimes they are hunting jobs and sometimes they are brisk young rovers who are taking a look at Mexico, just as later on they may drift into Turkey or London or Shanghai. They will turn their hands to anything that is not too permanent, from section hand to storekeeper. A banker I know came out as a "lunger" and got his first job keeping claim-jumpers off a mine. He sat in the sun all day with his rifle in his hands.

"I would not have shot if they had jumped the claim," he says now. "I was too sick. But they didn't know."

One of the greatest of the Mexican oil millionaires began his explorations as a camp cook.

THE FAMOUS BELLES OF TEHUANTEPEC

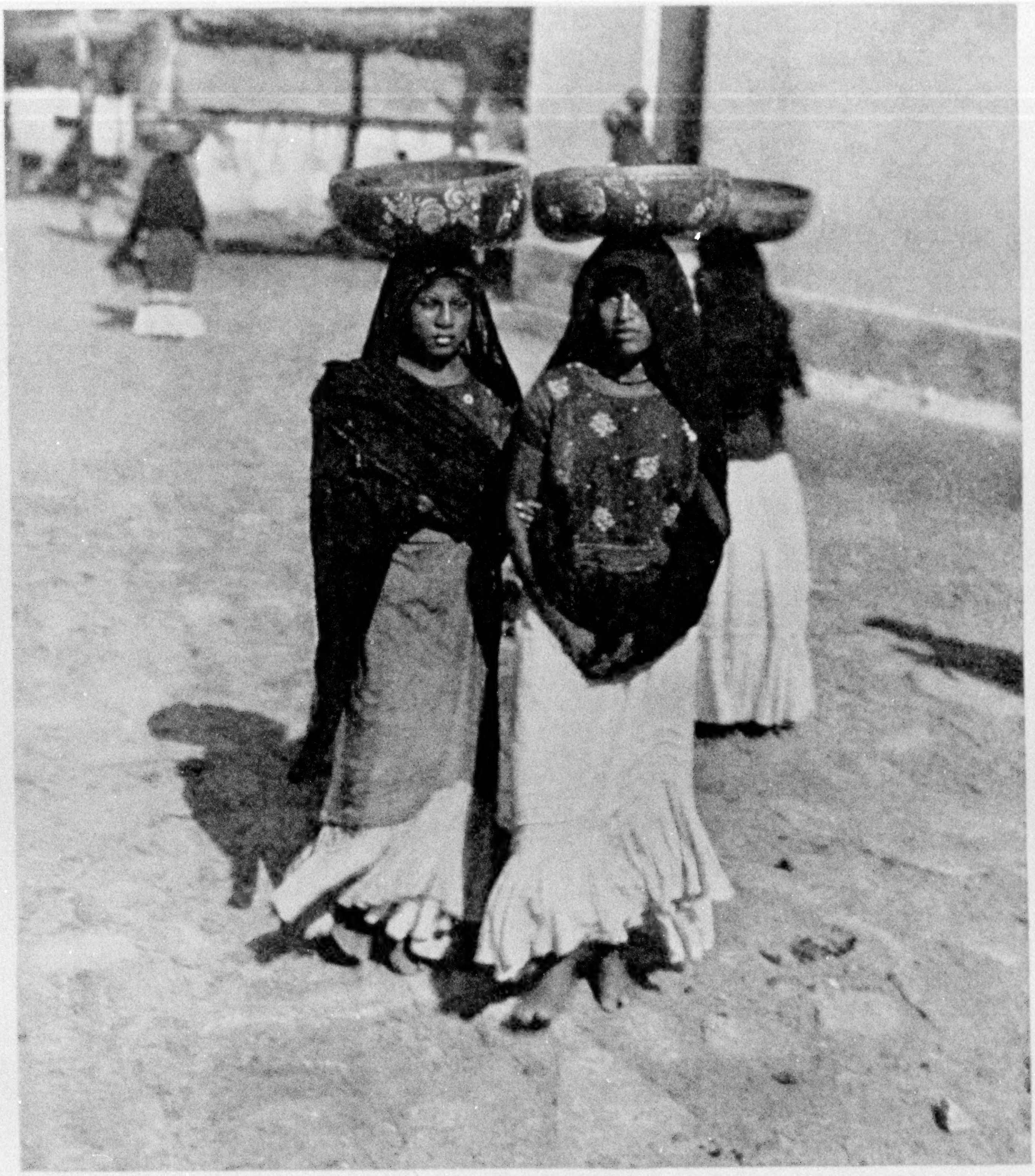
The city of Tehuantepec is very much like any one of the cleaner towns of the central plateau. It has a plaza, on one side of which is a substantial market house. During the day the beautiful women meet there to buy and sell and talk, while the men hang sullenly around the dusty streets or sit in doorways and look on (see pages 550 and 567).

As night comes on, candles begin to twinkle in the market house over white-clothed tables. It is the city club, the chamber of commerce, the sewing circle, the principal restaurant, and the Ladies' Aid Society of Tehuantepec.

The men and women wander from one table to another, buying food and drink by the centavo's worth, talking, smiling, clattering. To the eye of the stranger they seem very happy.

In an hour or so the candles burn out, the tables are cleared away, the women stalk off to their homes through the dark, quiet streets, their burdens on their heads. Sometimes a faint strain of music is heard through an opened door. The stars shine very brilliantly and very near. The story might be written of hundreds of little, unimportant, unknown towns throughout Mexico.

Tehuantepec's sole claim to fame rests on the good looks of its womankind. They march through the streets, erect,



Photograph by Clifton Adams

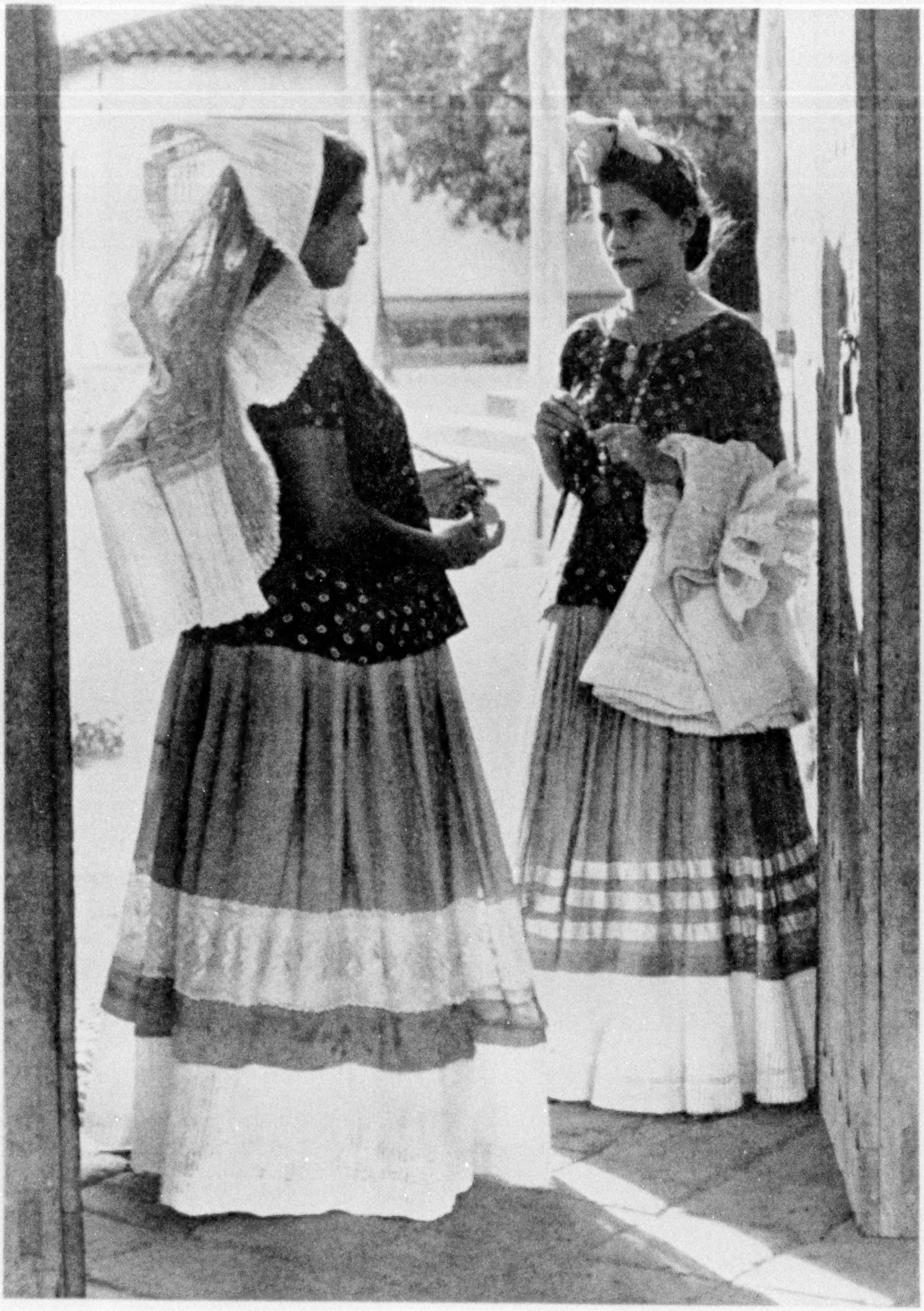
INDIAN WOMEN COMING FROM THE MARKET AT TEHUANTEPEC

The *jecapezles* (decorated gourds) sometimes exceed two feet in diameter. The center of their manufacture is Santa Maria de Guiniagate, a town lying among the hills about 25 miles west of San Gerónimo.

bare-footed, their ankles hidden by a froth of white drapery that escapes from beneath a skirt that may boast a score of hues, wrapped about the hips tight as a Burmese sarong and tucked neatly in at the bare waist. The short chemisette, armless and low-necked, offers a kaleidoscopic variety of color built on a foundation of Turkey red.

Sometimes one sees the royal purple of old Tyre—the Tyrian purple with which argosies were once freighted to the barbarians—for the same shellfish the Tyrians robbed lives on the sand banks of the Pacific coast.

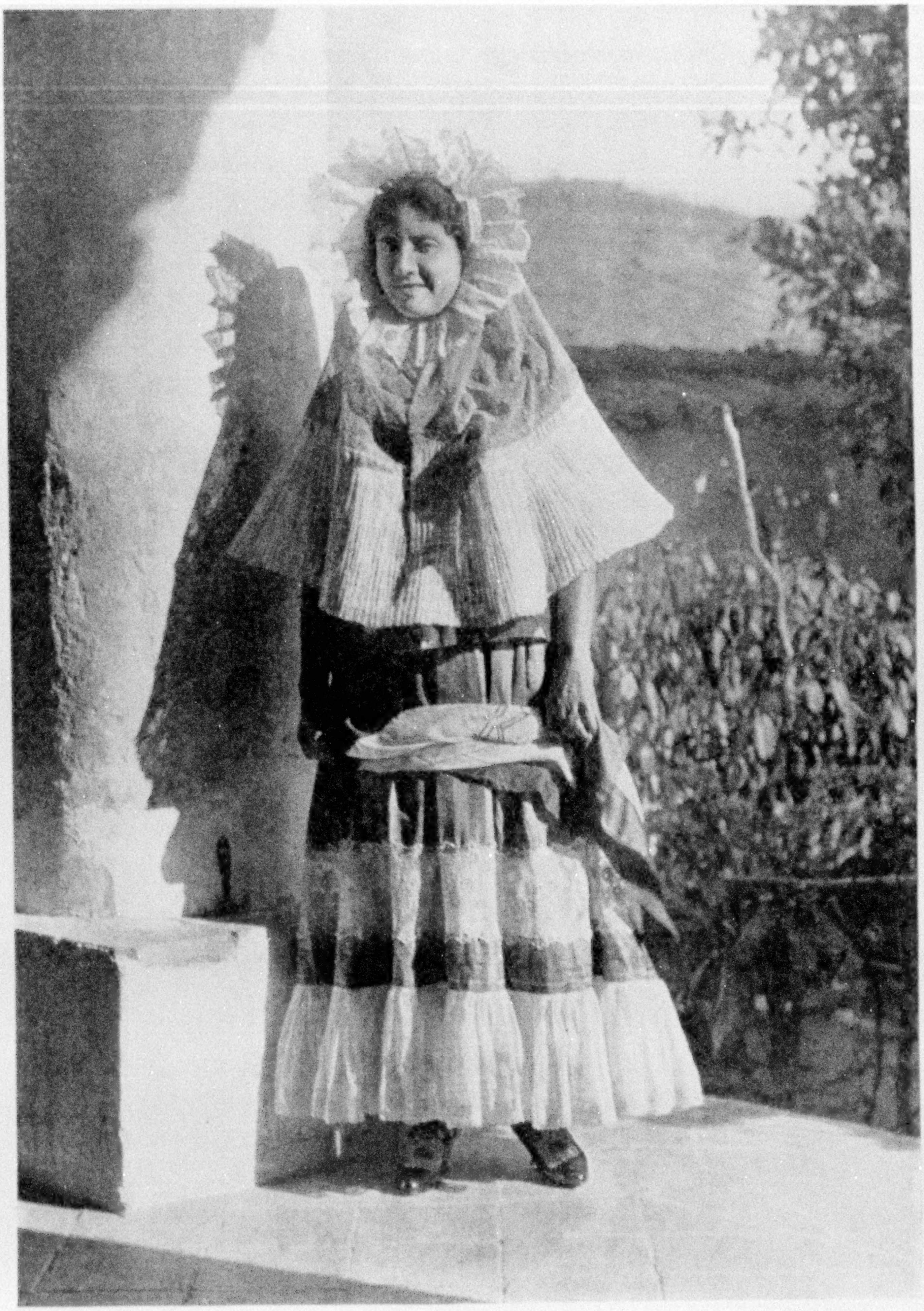
That is the every-day dress—a floating chemisette of many colors, a belt of bare, silky brown skin—the sarong twisted tight about the hips to end in a frivolous ruffle of white plaits that swirls and



Photograph by Clifton Adams

BIDDING THE VISITOR GOOD-BY

The girl on the left is wearing the *huipil grande* in the proper position on her head for a walk in the street. It is also permissible to carry the headdress folded over the arm, as shown at the right.



Photograph by Clifton Adams

READY FOR CHURCH

The white *huipil grande* is worn in a number of ways by the higher class of Tehuana women and makes known the owner's social status. This costume is suitable when the wearer is on her way to mass.

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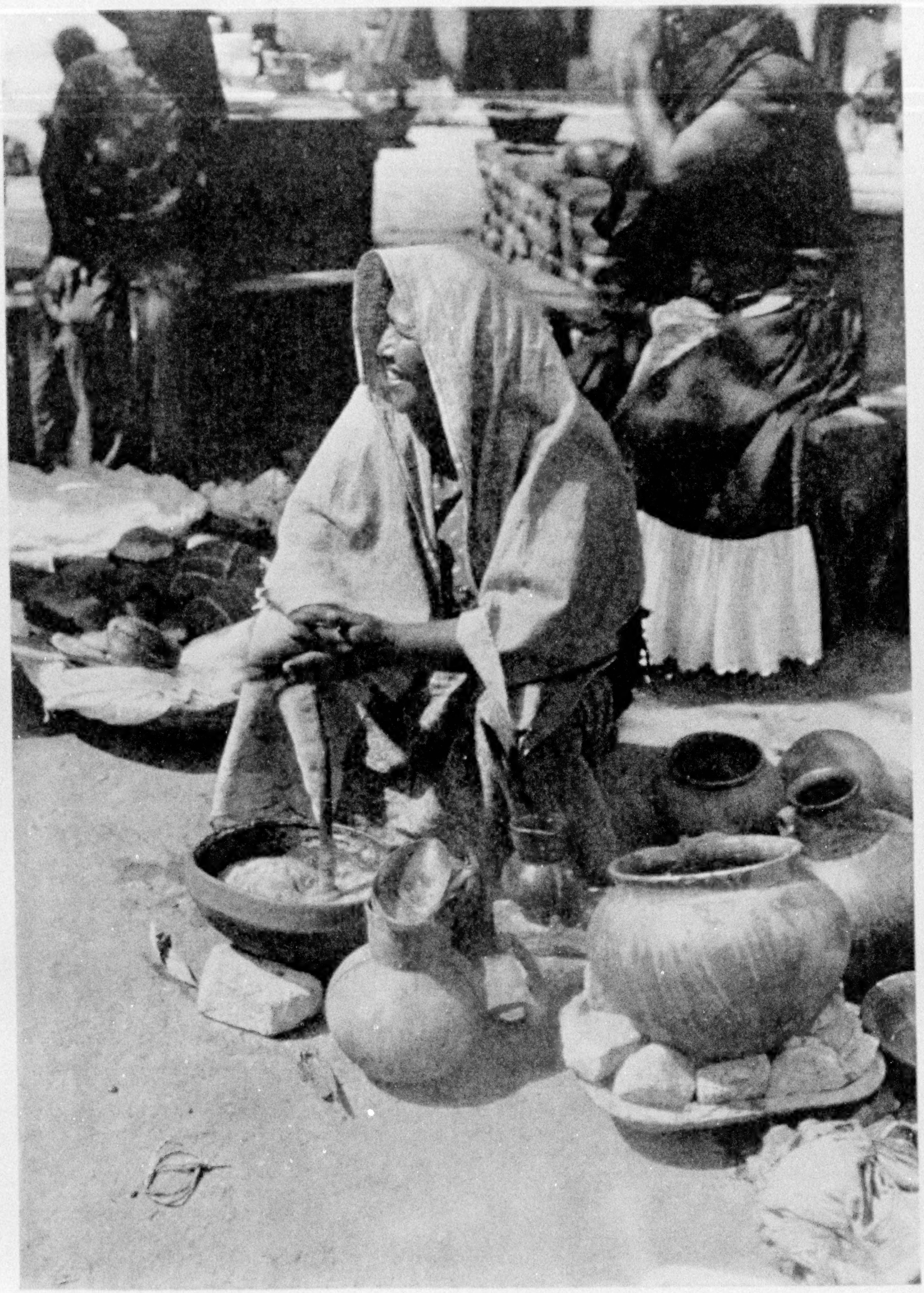
Photograph by Clifton Adams

RESPONSIBLE FOR THE FAME OF TEHUANTEPEC

The Tehuana Indians belong to the Zapotec tribe, which, according to tradition, built the great fortress of Mitla. The women have been noted for their beauty for many generations.



Photograph by Clifton Adams

THE JOLLY SEÑORA IS PREPARING BREAKFAST

She grinds the corn on a flat stone called the *metate*, and makes large flat sheets of bread which are never brown—tortillas. The American prefers the *totoposte*, or crisp variety.

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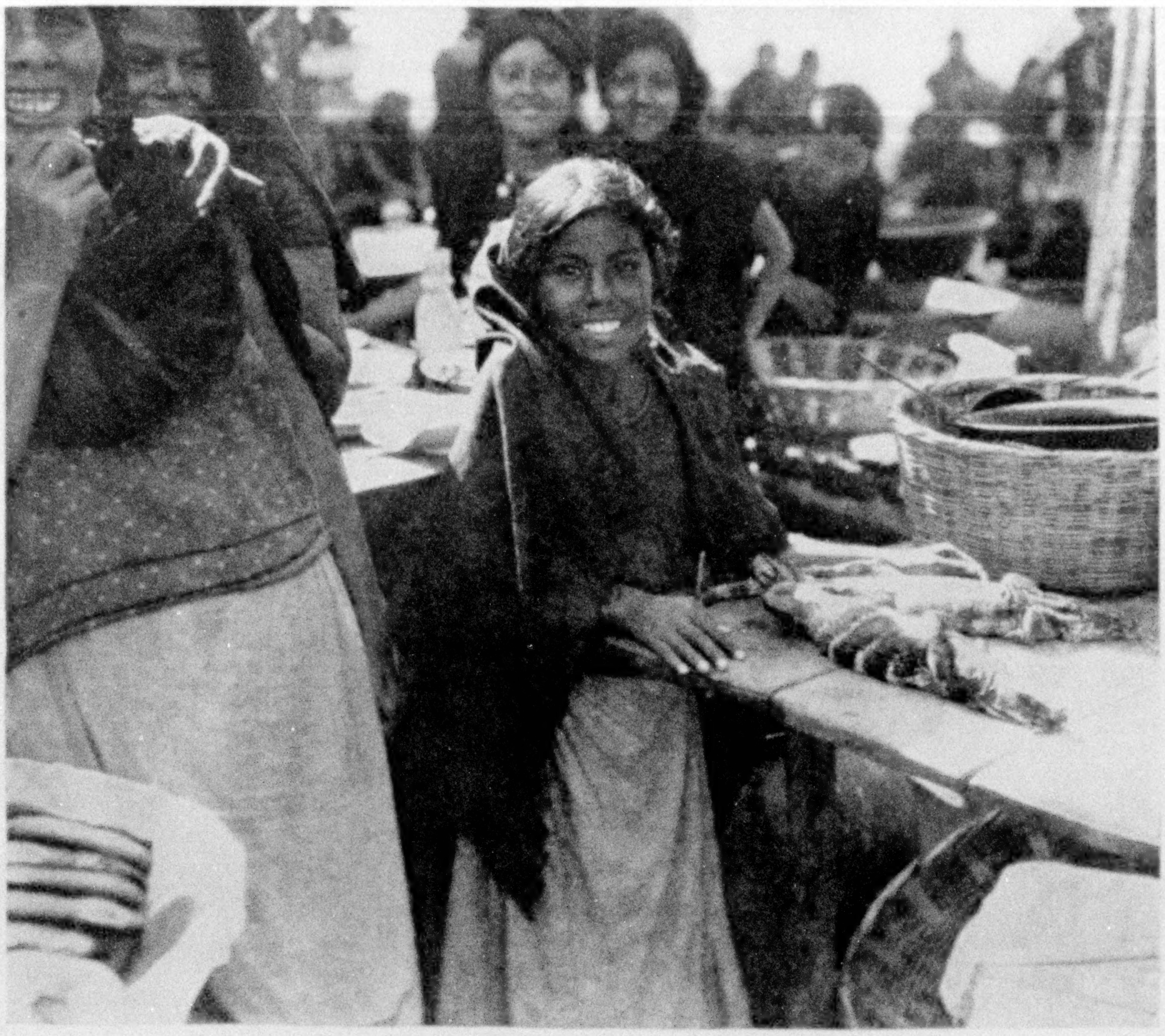


Photograph by Clifton Adams

MEXICAN DELICACIES IN THE MARKET OF TEHUANTEPEC

The repulsive-looking iguanas have clean, white flesh, which, when fried, is much preferred to beef or chicken by the Indians. It is the cruel practice among the women, who sell the reptiles alive in market, to break their backs in order to prevent their escape. The more humane venders merely tie the legs and mouths.

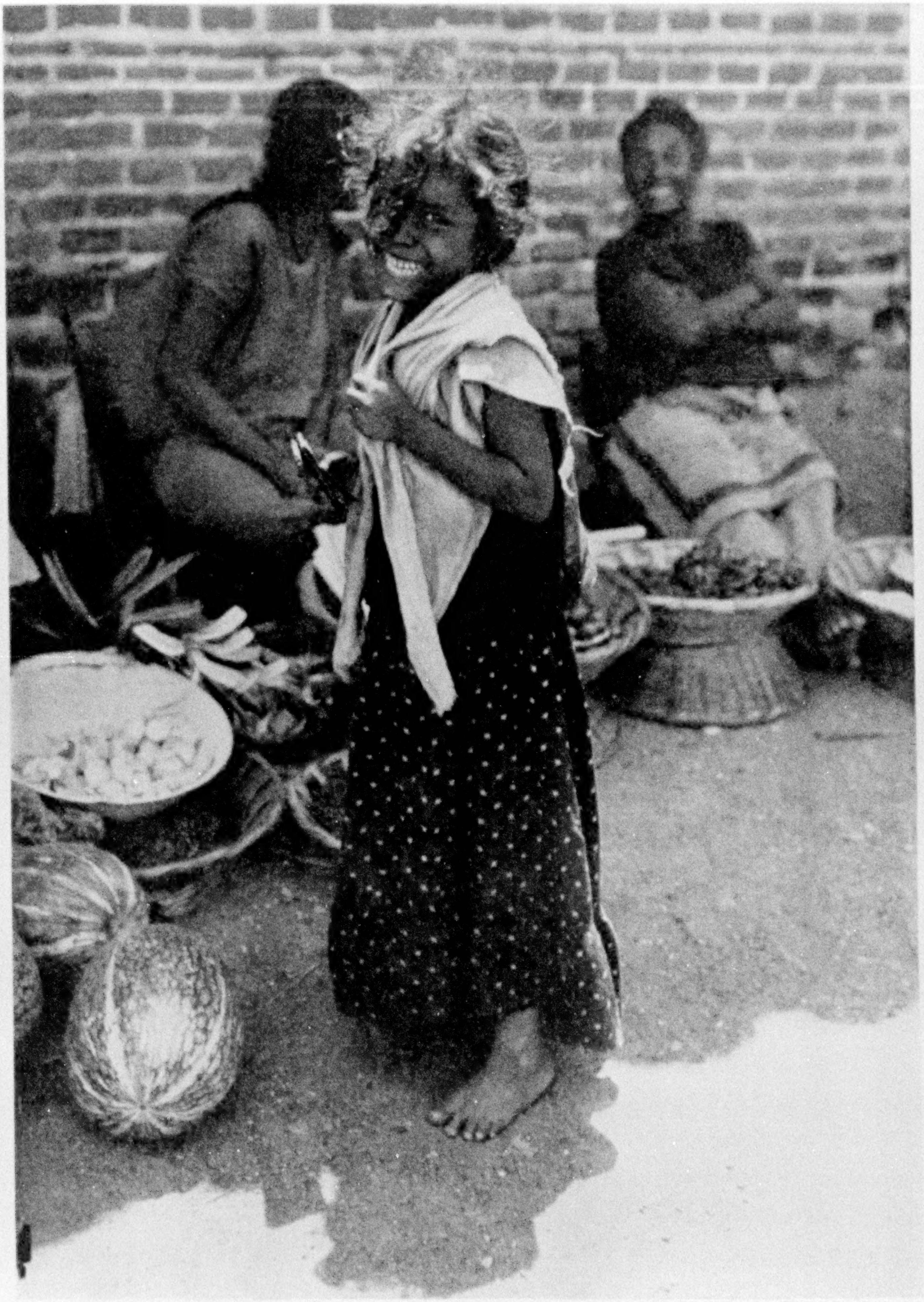
dances just above the strong, bare feet. The coquette may add a bracelet or two, or a gold chain may emphasize the depth to which the neck of the *cotón* (chemisette) has been cut. Add the half of a shallow gourd, sometimes two feet wide, painted and embossed in green and red and black until it seems to shine almost with Chinese lacquer. In these gourds, set on their heads, they carry everything (see illustrations, pages 568 and 569).

MOTHER AND NURSING BABY SMOKE TOGETHER

The nursing baby comes to the market place in a gourd on his mother's head. Sometimes the nursling is three or four years old, and after mother has nourished him he squats naked on the curb and he and mother smoke their cigars together. One hardly ever gets used to the extent to which domesticity is practiced in Mexico.

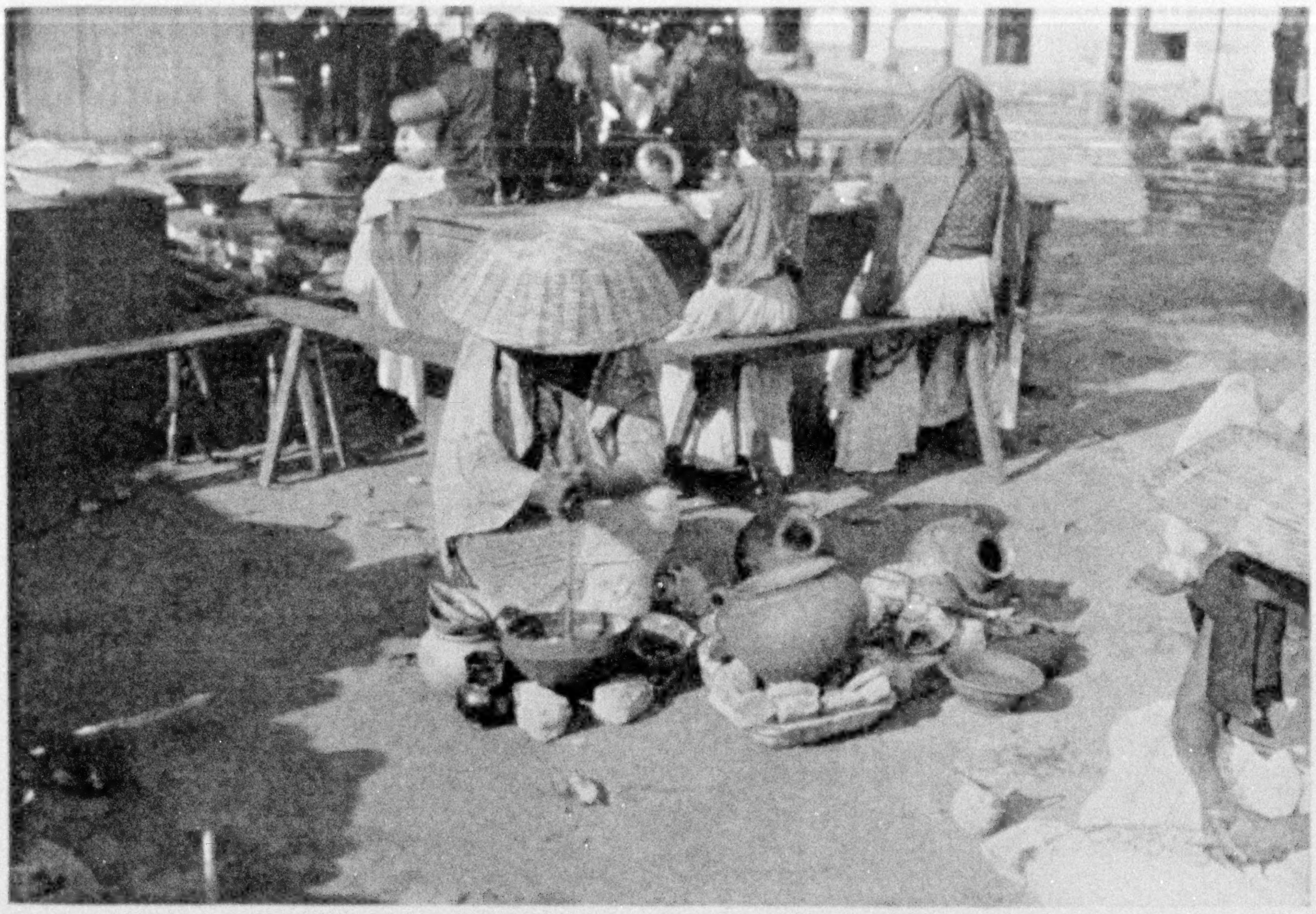
The *lavanderas* carry the wash in their gourds, the snowy twists piled high, and walk with an undulating certainty that only a lifetime of head burdens could grant. The market women tote pyramidal loads of melons and vegetables and the unescapable tortilla rides to the plaza in stacks two feet high, lightly covered by white cloths.

Always the laughing eyes of the women seek those of the stranger, and the red lips part to show the white teeth. The camera does an injustice to the beautiful women of Tehuantepec. It emphasizes the fact that they are Indians, brown-skinned and sturdy-waisted, and fails to



Photograph by Clifton Adams

A SMILE STIMULATES A SALE



Photograph by Clifton Adams

THE "MERRY WIDOW" VARIANT AT TEHUANTEPEC

The señora is utilizing the shade of a large basket, as she mixes her dinner menu in the corner of the market.

register the qualities of spirit and courage and sprightliness that make them beautiful. It can not truly depict their proud carriage or the floating ease of their walk or the coquetry in their black eyes. They know they are beautiful, for they have been told of it for generations. They are confident, yet not bold.

The Tehuantepecs are of the Zapotec tribe which was once the suzerain of this southern country. According to Zapotec tradition, which may or may not be relied on, they built the fortress of Mitla,* six days' ride westward by mule and a constant puzzle to archeologists. Not far away is the ruined city of Guerenguela, which once sheltered thousands behind its fortifications and is now but a heap of tumbled ruins. The Zapotec tradition is one of battles, just as for generations their women have been known for beauty.

On feast days the women wear their dresses of ceremony. The chemisette is lace then, or silk of many hues. The headdresses which adorn them in gourdless hours become cascades of embroidery that descend their straight backs like the war bonnets of our own Comanche chiefs (see pages 570 and 571).

Not a girl in Tehuantepec but has such a dress put safely away, and there are few who do not own a necklace of gold coins, American by preference. The revolution was hard on such treasures, it is true, and one does not see them often. Many a Tehuana girl has buried her necklace until peace comes to stay.

As one marches toward the cup of dry and dusty hills in which the city is set, one becomes enamored of its beauty and serenity. It is not often that an oxcart rumbles over the cobbles in these days of depression. Sometimes a string of burros, their dainty hoofs tap-tapping on the stones, tramps by with the usual air of inquiring intelligence. One passes a school to hear the boys inside roaring out their lessons in chorus.

An old church bell sounds. Bright eyes look from between the jalousies of the old Moorish houses, of which the reds

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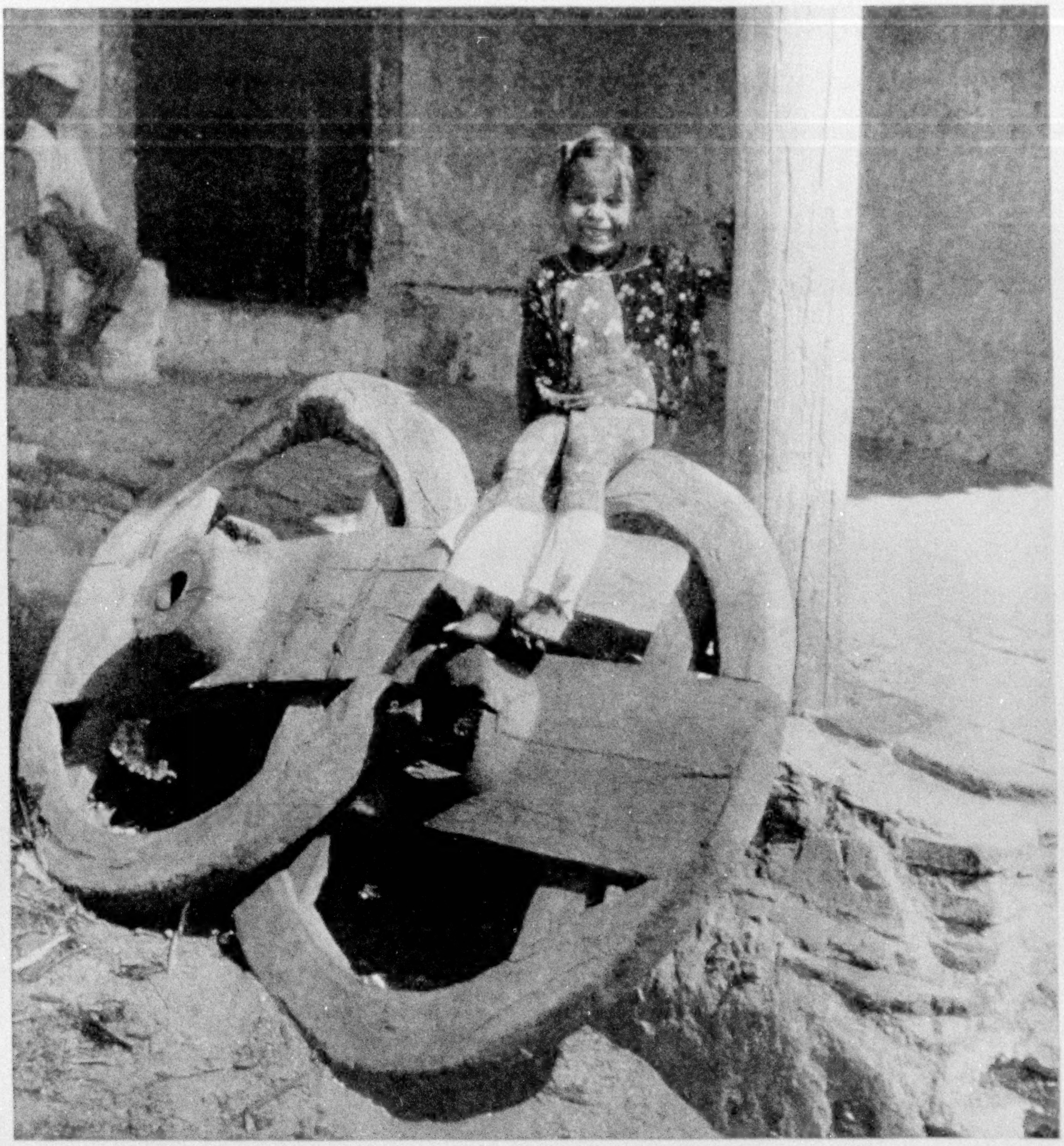
* See "Hewers of Stone," by Jeremiah Zimmerman, D. D., LL. D., in THE GEOGRAPHIC for December, 1910.



Photograph by Clifton Adams

A SHY TEHUANA MAID

The little lady is seated upon the immense wheels of the type of two-wheeled carts used for heavy hauling on the Isthmus of Tehuantepec. The oxen are yoked to these heavy vehicles by the horns.

and blues and purples have been softened by two centuries of sun.

Utterly naked babies stand shameless in the doorways to inspect the wanderer, and along the sands of the Tehuantepec River, which flows, broad and shallow, between green fields, are brown and rounded women at their daily bath.

Salina Cruz is a confession of failure written in dust and wind. It is a scattering, arid, sandy desert of houses in which the two or three hotels are lonely oases.

The white-hot sun beat upon the reaches of dry, loose sand. An oxteam or two dragged creaking wagons languidly toward the huge docks, on which $40,000,000 had been spent and at which four or five small vessels were loading coffee. Once this port bustled with business. Before the Panama Canal was opened, merchants transshipped east- and west-bound goods here rather than make the long voyage around Cape Horn. Then every one had money. One can see sig-

XUM

nificant evidences of the former prosperity in two or three substantial buildings and the manner in which the town was laid out.

THE RISE AND FALL OF THE TRANS-ISTHMIAN RAILWAY

Even before the Panama Canal was opened, the goose which was laying the golden eggs had been discouraged, according to business men. Goods boxes were robbed or disappeared entirely. Sometimes the robbing was done at the docks, but not often, for there white men ran affairs with strong hands. But on the forty daily freight trains—twenty each way—the Mexican crews did as they pleased. They dumped boxes and bales into the jungle to be dealt with later by their confederates.

Customs officials proved hard to deal with and the shippers were discouraged.

Some of the war-made business came Tehuantepec's way, but not much. Just how much no one knows, for the statistics are unreliable even when they are get-at-able.

The Indian market was the one place in Salina Cruz in which animation could be discovered. The Indians chattered, bought centavos' worth of food from pots smoking over hat-size fires, chaffered over bargains, laughed at the intruding stranger, slept in the sun.

The iguana saleswomen had broken the backs of their stock in trade to keep them from running away. Some of the more merciful of the market-women had twisted the forelegs of these ugly lizards over their backs and lashed them together with withes. There are enthusiasts who insist that the meat of an iguana is white and sweet and tender, but after experiment it seemed to me more to resemble the leathery carcass of an old hen.

There were parrots for sale, and the skins of tigers, and now and then a coatimundi, which looks like a raccoon with an elongated snout.

There were no banks in Salina Cruz. Now and then a merchant needs an American credit and will buy bills or bank drafts, but for the most part they decline dealings with the Gringo. I ventured into two or three stores to announce that my stock of gold was running low, and that I would like to replenish it. The storekeepers did not even flatter me by interest. They merely said that they had no gold, and that my plight did not touch their hearts. If it were not for the foreign consuls, the stranger to Salina Cruz would find himself out of luck.

PUERTO MEXICO, ON THE ATLANTIC SIDE

We plunged again into the jungle on the way to Puerto Mexico, the Atlantic port of the railroad.

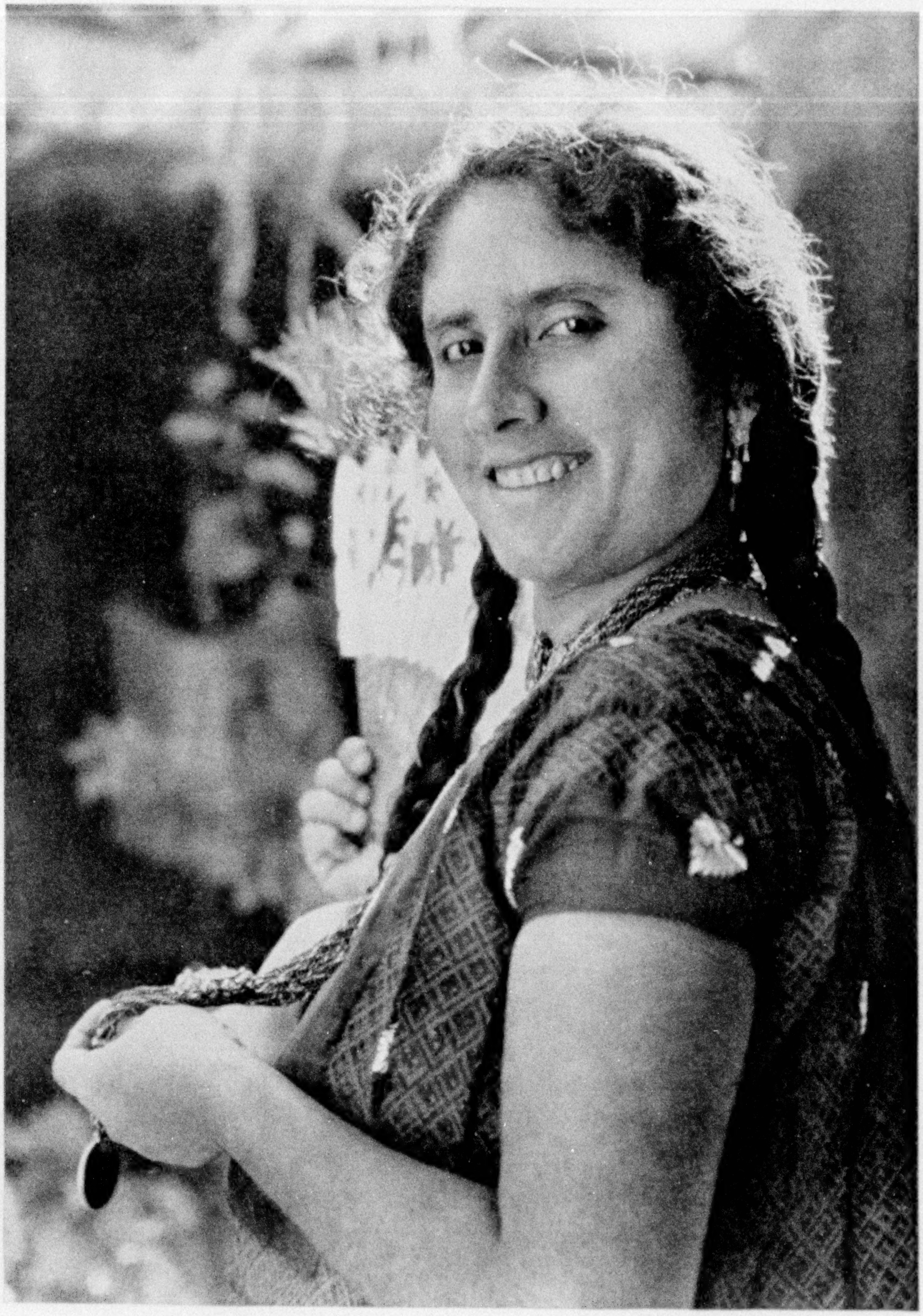
Puerto Mexico is the typical tropical water-front town. The streets are shoe-top deep in white-hot sand. Chickens pant for breath, undisturbed by a traffic that hardly exists, lifting wings from their burning bodies. Mounted men help the occasional wagoner by ropes from their saddle horns.

At last I was reduced to sitting on the hotel veranda to watch the long streamers of dust blow off the parched land into the green river. Narrow dugouts were being perilously paddled against the tidal current, in which silly porpoises rolled over and over forever. My eyes were miserably drawn to the reddened insect bites on the puffy arms of the lady at the next table. Inside the long bar was the lazy click of pool balls and the rattle of dice.

The tired waitress assured a wanderer that no one eats fruit in the Tropics. "Bad for the estomac," she said.

Oil tankers churn up the river as far as Minatitlan, rolling waves into the water grasses and lilies, submerging the placid alligators that rest with their long snouts thrust over the branches of half-sunk trees. Clouds of black smoke pour from the stacks of the refinery town. There are royal palms, and troops of little monkeys scold each other through the vines.

At night one sometimes hears weird screams from the dark wood. The man from an ordered, disciplined, kindly countryside resents the brutal heat, the furious growth, the savage morasses of the jungle. And yet one leaves with a feeling of sadness.



Photograph by Clifton Adams

HER NECKLACE, EARRINGS, AND FAN ARE HER PRIDE

The Tehuana girls wear heavy gold jewelry, the twenty-dollar gold piece of United States currency being a favorite article of adornment (see text, page 576).

OUR MAP OF NORTH AMERICA

THE National Geographic Society presents to its members as a supplement to this number of their Magazine a new Map of North America in six colors, the ninth in its series issued since February, 1921, as supplements with the NATIONAL GEOGRAPHIC MAGAZINE.

Those previously issued as parts of The Magazine were the New Map of Europe showing the changes in boundaries made by treaties following the World War, the New Map of Asia, the New Map of Africa showing the mandated colonial areas, the New Map of the World, and maps of South America, of the Islands of the Pacific, of the Countries of the Caribbean, and of the United States.

The Society has distributed among its members, who now number 900,000, a total of 10,476,000 copies of these maps. They have been received with remarkable enthusiasm, not only by members of The Society, but by map experts throughout the world and officials in many branches of the United States Government, and especially in schools and colleges throughout the Nation.

More than a year has been devoted to the compilation of the data for and the engraving of this Map of North America, which represents an outlay of $50,000, and has special features which no previously published map of this continent shows.

More place names in the Polar regions are given and the islands to the north of Canada are shown in more detail than on any other single map sheet.

Special care has been taken to show in great detail the coast of Alaska, so that when American aviators essay their deferred flight to the Pole their bases may be readily identified.

The Canadian portion of this map incorporates the latest information compiled by the Canadian Government, including recent surveys made in little-known portions of the Dominion, and appreciative acknowledgment is here made to the Department of the Interior of the Dominion for its valued coöperation.

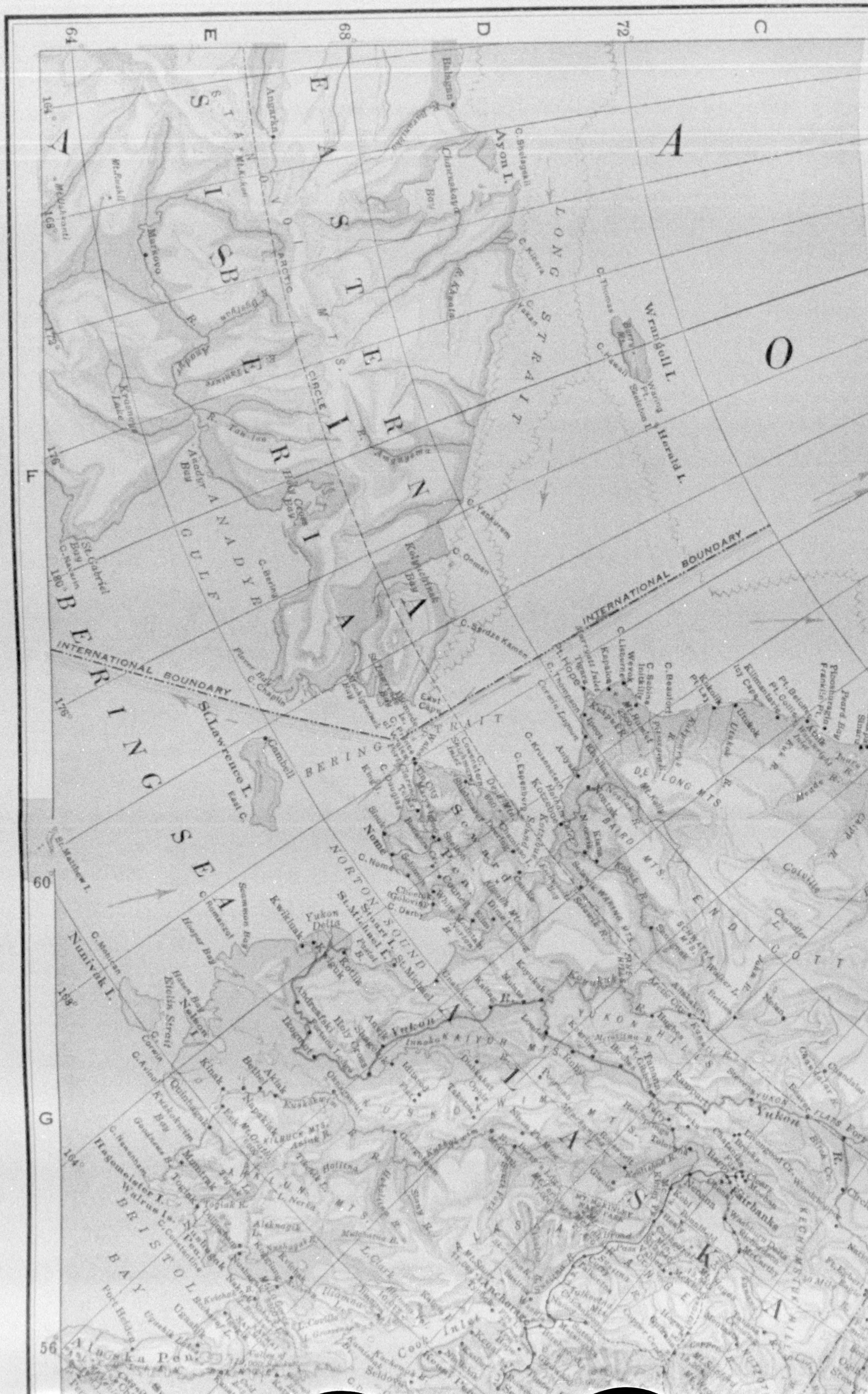
In order that the Map of North America might be free from the usual distortion attendant upon showing any large portion of the earth's surface, the Chief Cartographer of the National Geographic Society devised for this map a special projection which gives the true direction and true distance from the center of the map to every other point. This projection is intermediate between the conformal, which has scale errors, and the equal-area projection, which has distortion of form.

The general elevation of the land is shown in flat colors, as on other maps of The Society, but in addition a special hachure plate is here used to show the general trend of the mountain ranges, thereby greatly improving the topographic aspects of the map.

The more important railroads, particularly the transcontinental lines, have been shown, but the automobile and park-to-park highways and the location of our National Parks and Monuments and other features may be studied in greater detail on The Society's Maps of the United States and of the Countries of the Caribbean.

Additional copies of the Map of North America may be obtained from the headquarters of the National Geographic Society, in Washington, D. C., at $1.00 each, for the paper edition, or $1.50 on linen, mailed postage free in the United States; foreign postage, 25 cents additional. Other maps of the series are available at the same prices, with the exception of the Map of the Islands of the Pacific, which may be obtained in paper for 50 cents and on linen for $1.00.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your July number, the Society should be notified of your new address not later than June first.*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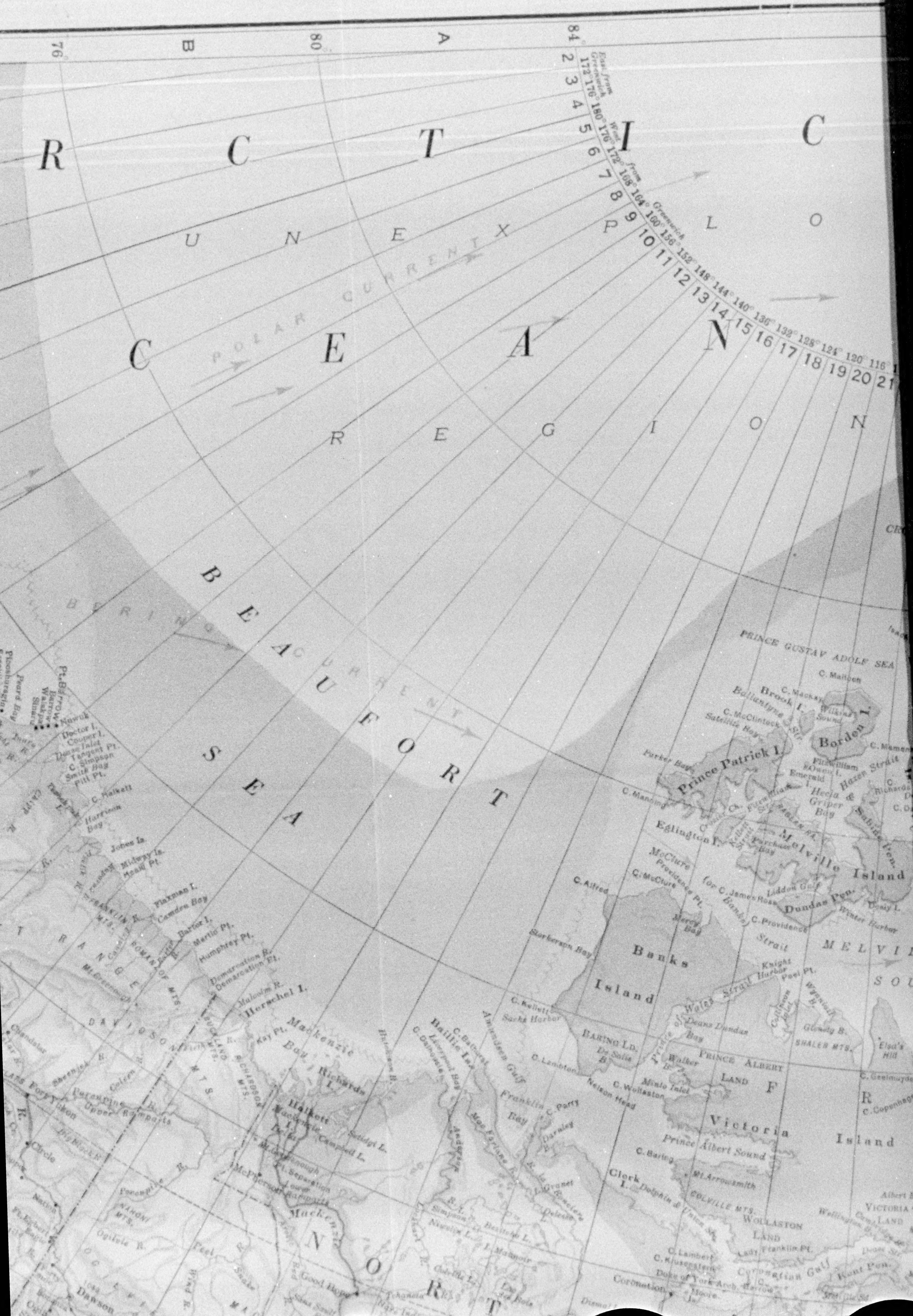

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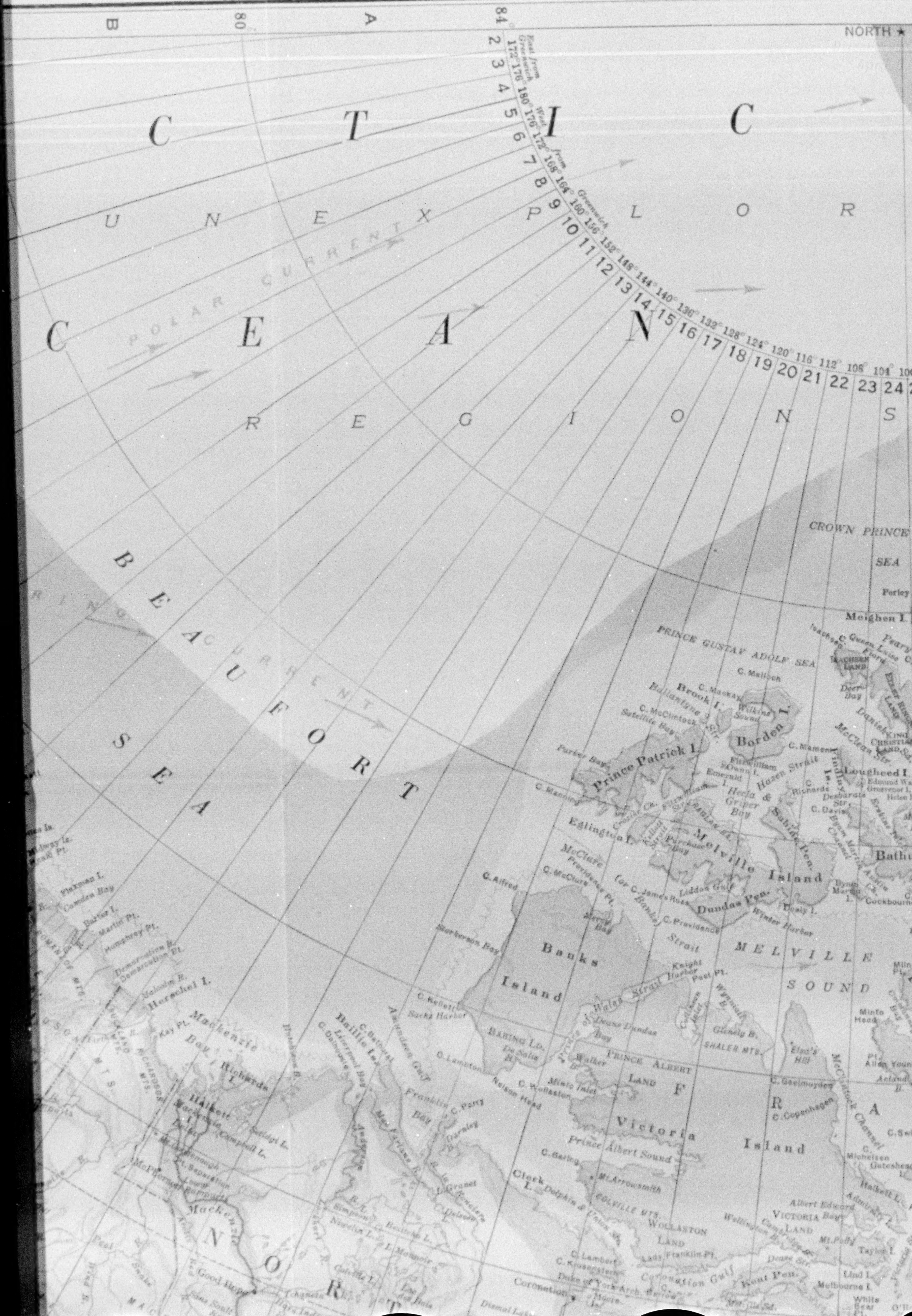
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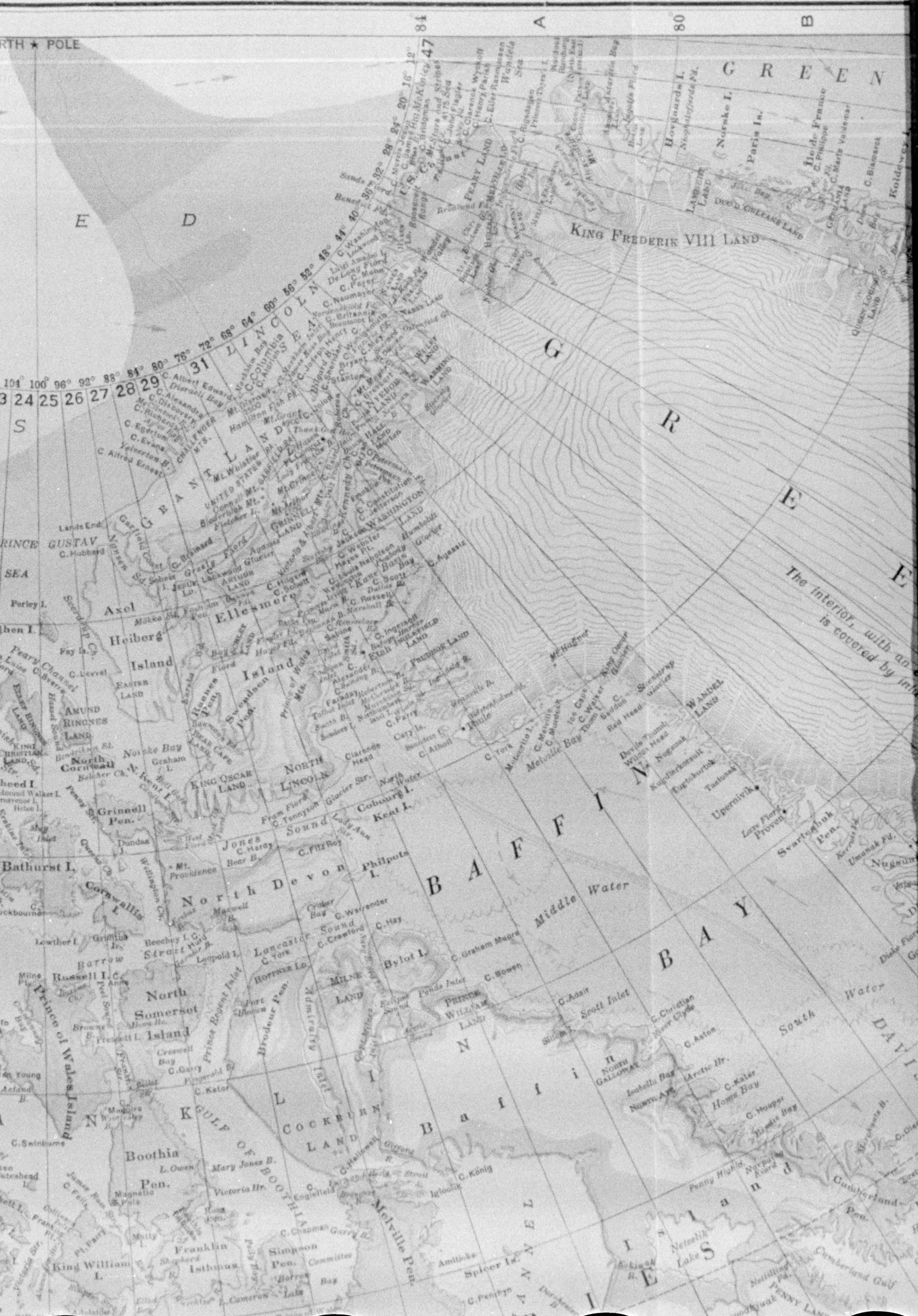

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C. Bowen
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Admiralty Inlet
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C. Adair
Scott Inlet
C. Christian
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C. Kater
Home Bay
C. Hooper
Exeter Bay
Cumberland Pen.
Cumberland Gulf
Baffin Island
COCKBURN LAND
GULF OF BOOTHIA
Boothia Pen.
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Simpson Pen.
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C. Swinburne
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C. Warrender
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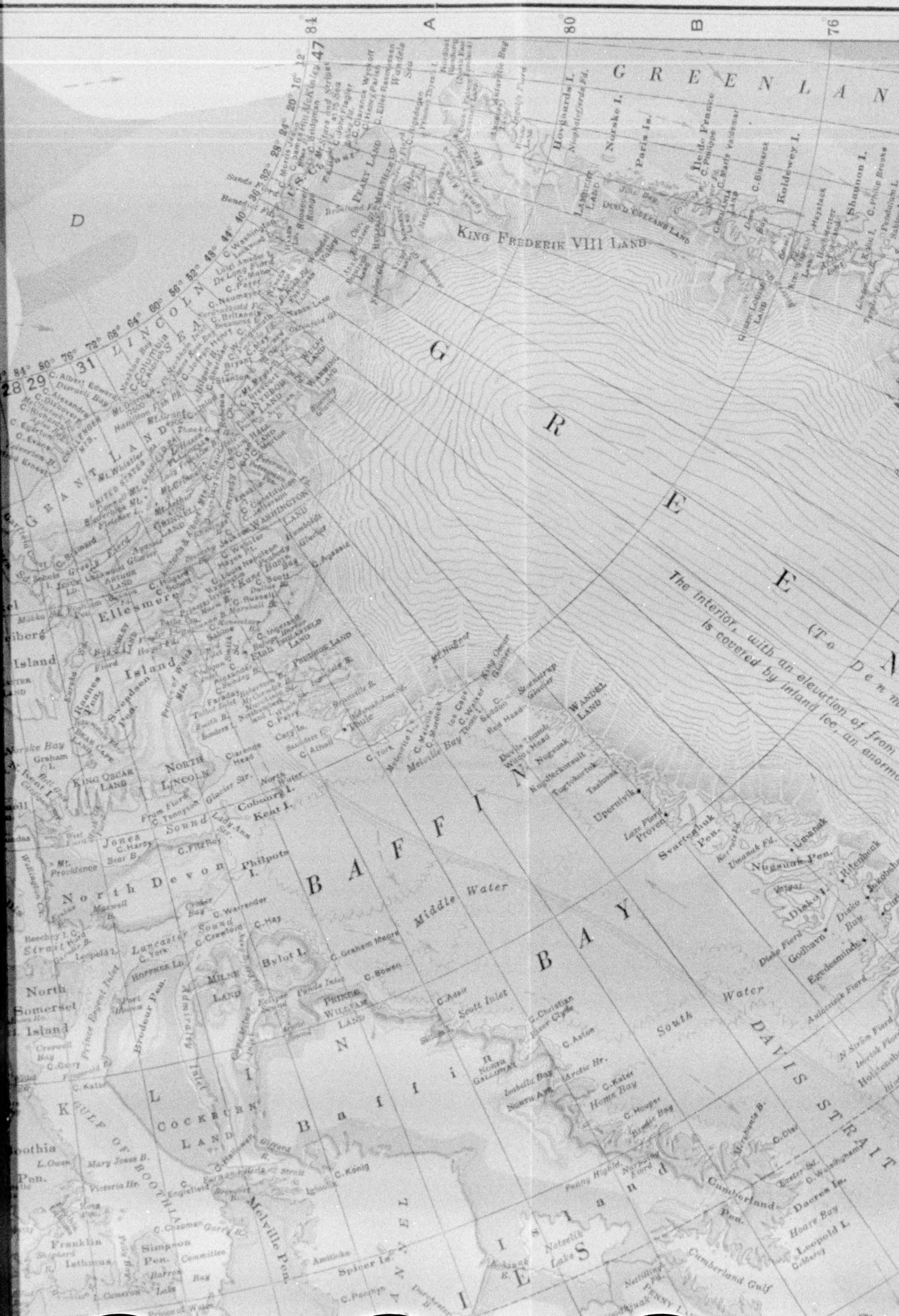
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Prince Regent Inlet
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Scott Inlet
C. Christian
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Shannon I.
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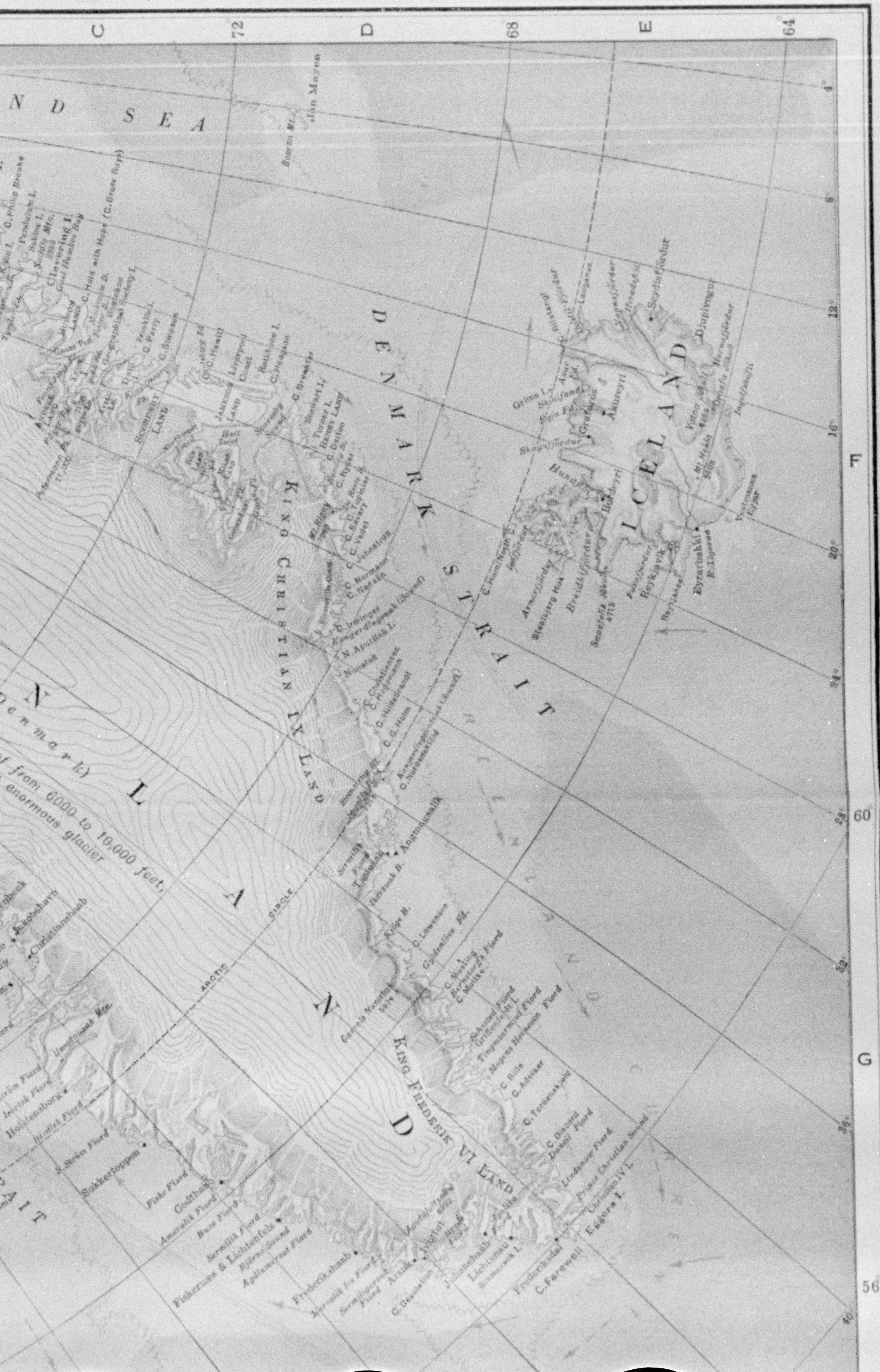
DUC D'ORLEANS LAND
C. Bismarck
Wandels Sea
C. Washington
C. Morris Jesup
Sands Fiord
Benedict Fd.


C
72
D
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E
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4°
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16°
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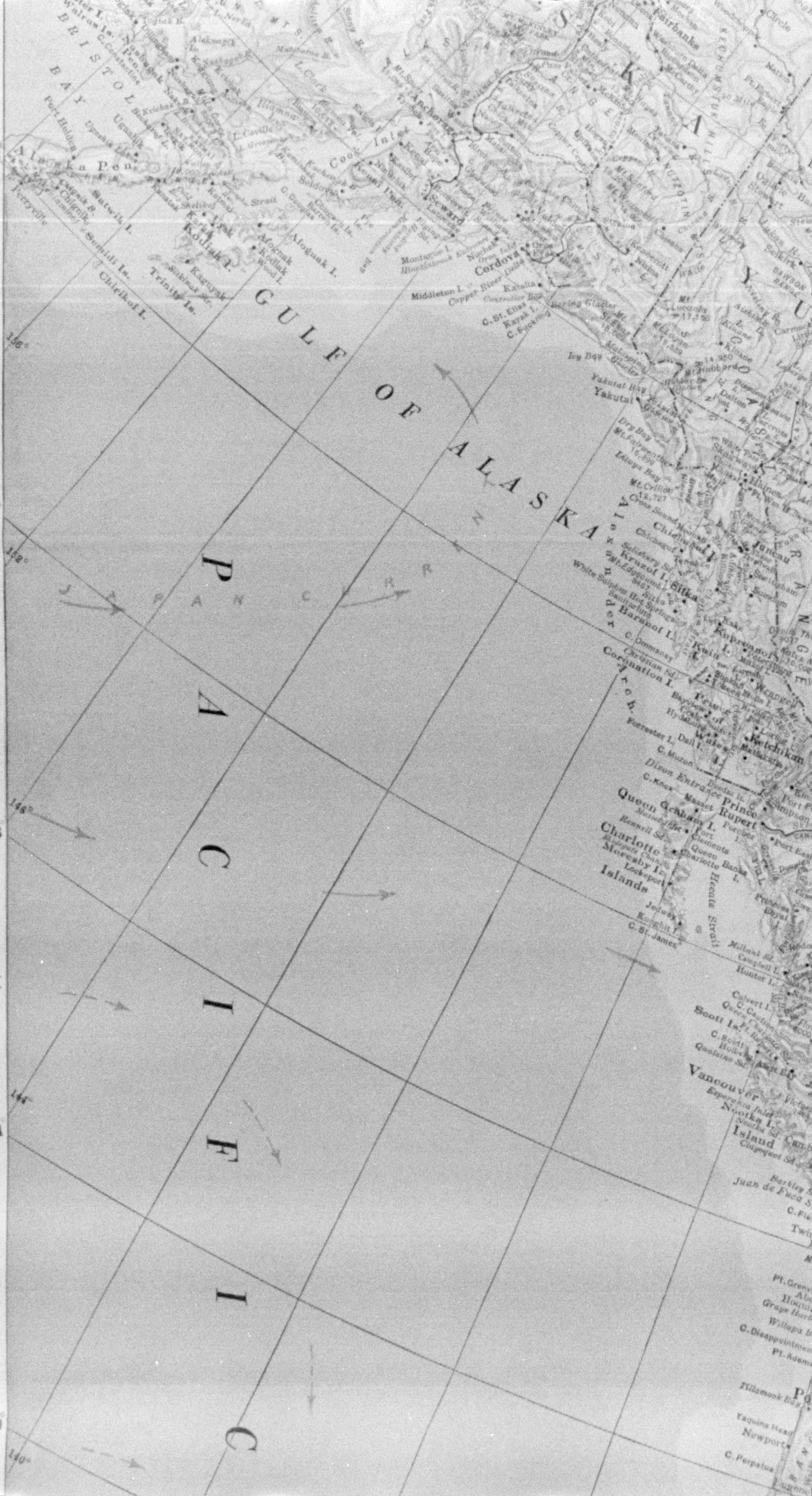
40°
N D   S E A
Jan Mayen
Beerenberg Mt.
DENMARK STRAIT
ICELAND
Akureyri
Reykjavik
Eyrarbakki
Seydisfjördur
Djupivogur
Husavik
Skagafjördur
Isafjördur
Breidhifjördur
Snaefells Jökull 4715
Vestmanna Eyjar
Grims I.
KING CHRISTIAN IX LAND
KING FREDERIK VI LAND
SCORESBY LAND
JAMESON LAND
Liverpool Coast
C. Brewster
C. Dalton
C. Barclay
C. Normann
C. Irminger
Kangerdlugsuak (Sound)
Angmagsalik
C. Dan
Kôge B.
C. Löwenörn
C. Mösting
C. Moltke
C. Discord
C. Farewell
Eggers I.
Christian IV I.
Prince Christian Sound
Lindenow Fiord
Frederiksdal
Julianehaab
Frederikshaab
Fiskernaes & Lichtenfels
Godthaab
Sukkertoppen
Holsteinsborg
Christianshaab
Jakobshavn
Ameralik Fiord
Buxe Fiord
Fiske Fiord
S. Strom Fiord
Arsuk
Ivigtut
C. Desolation
ARCTIC CIRCLE
N
L
A
N
D
(D e n m a r k)
from 6000 to 10,000 feet,
enormous glacier
Clavering I.
Sabine I.
Pendulum I.
C. Philip Broke
Gael Hamkes Bay
C. Parry
C. Stevenson
T R A I T



H
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156°
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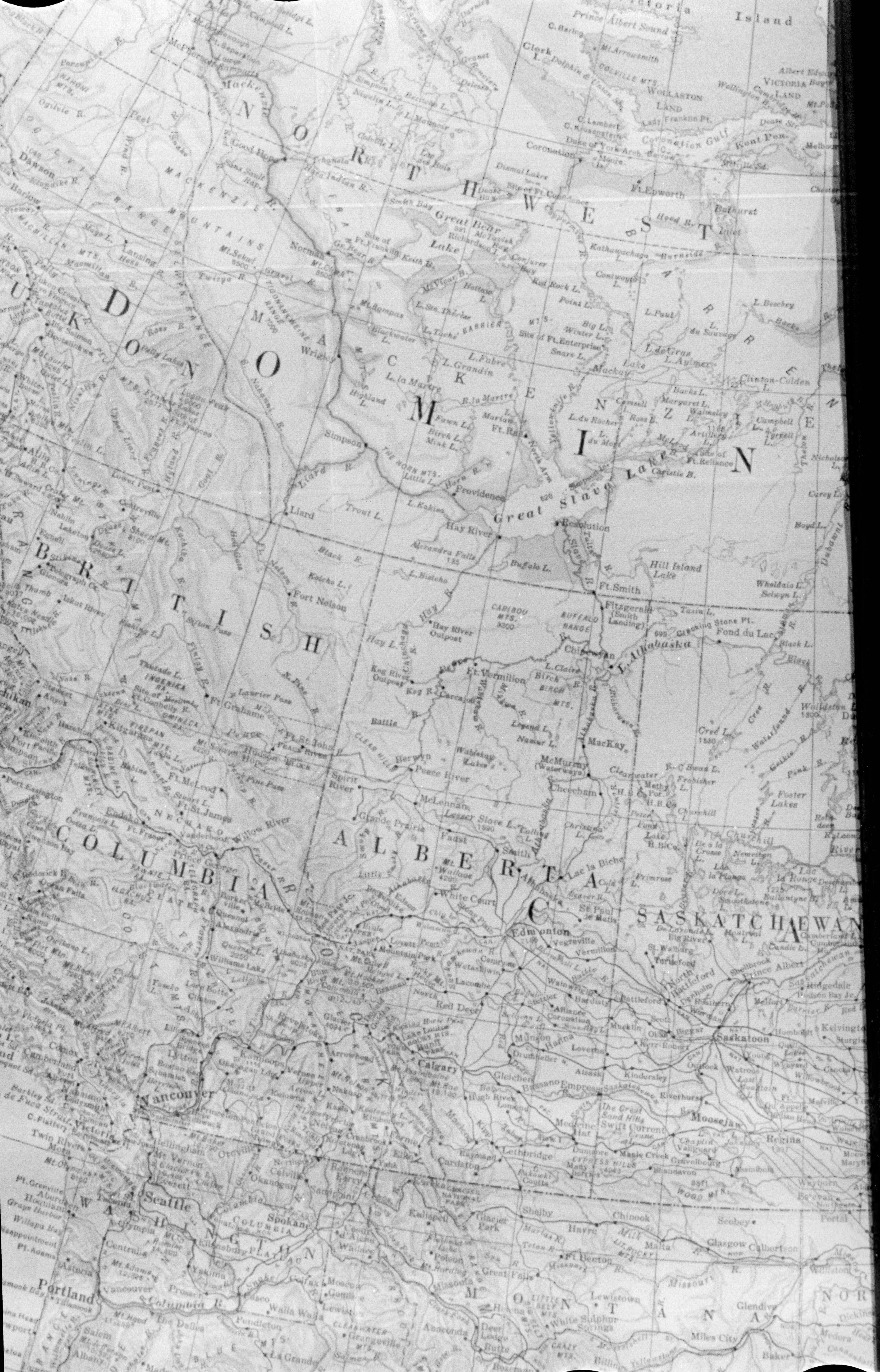
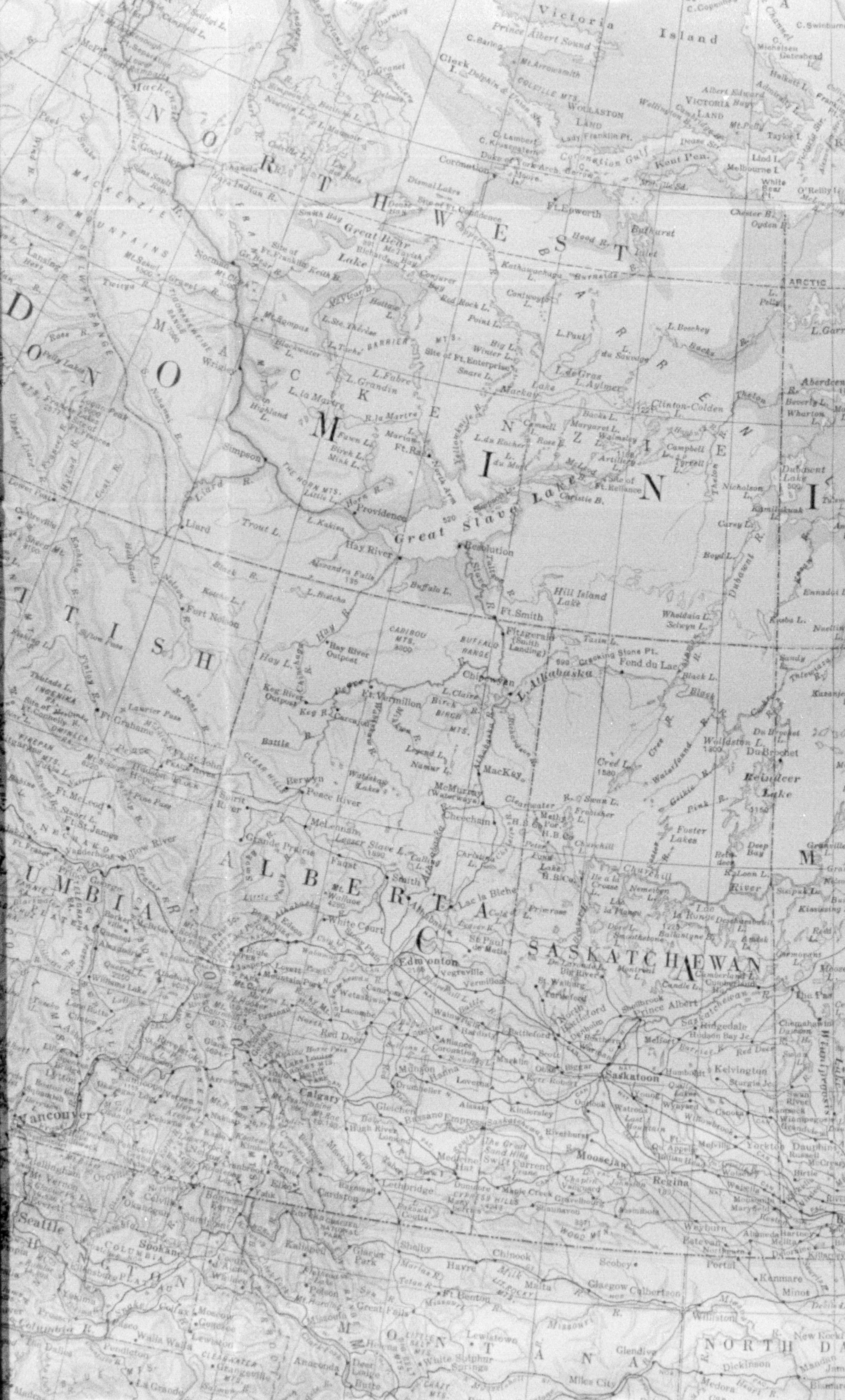
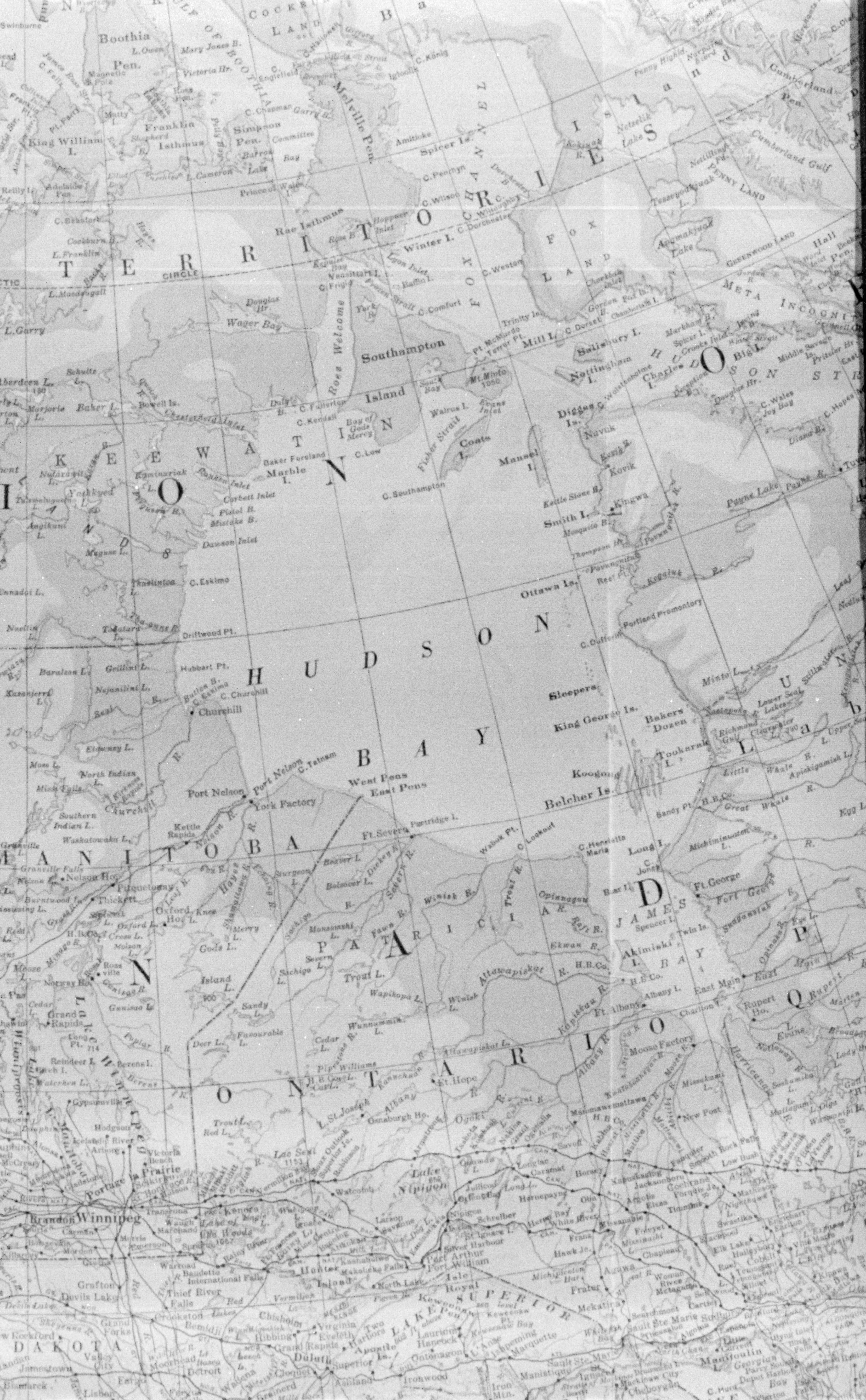
BRISTOL BAY
Port Heiden
Ugashik
Alaska Pen.
Chignik
Perryville
Sutwik I.
Semidi Is.
Chirikof I.
Trinity Is.
Kodiak I.
Afognak
Kodiak
Shelikof Strait
Cook Inlet
Seldovia
Anchorage
Seward
Kenai Pen.
Montague I.
Cordova
Middleton I.
Copper River Delta
Katalla
C. St. Elias
Kayak I.
C. Suckling
Icy Bay
Mt. Hubbard
Yakutat Bay
Yakutat
Dry Bay
Mt. Fairweather
Mt. Crillon
Lituya Bay
Chichagof I.
Kruzof I.
Sitka
Juneau
Baranof I.
Kupreanof I.
Kuiu I.
Wrangell
Coronation I.
Prince of Wales I.
Dall I.
Ketchikan
C. Muzon
Dixon Entrance
C. Knox
Masset
Prince Rupert
Queen Charlotte Islands
Graham I.
Moresby I.
Hecate Strait
C. St. James
Scott Is.
Vancouver Island
Nootka I.
Juan de Fuca Str.
Fairbanks
Circle
Whitehorse
Skagway
Haines
GULF OF ALASKA
JAPAN CURR
PACIFIC
Alexander Arch.
Tillamook Bay
Yaquina Head
Newport
C. Perpetua
C. Disappointment
Willapa B.
Grays Harbor

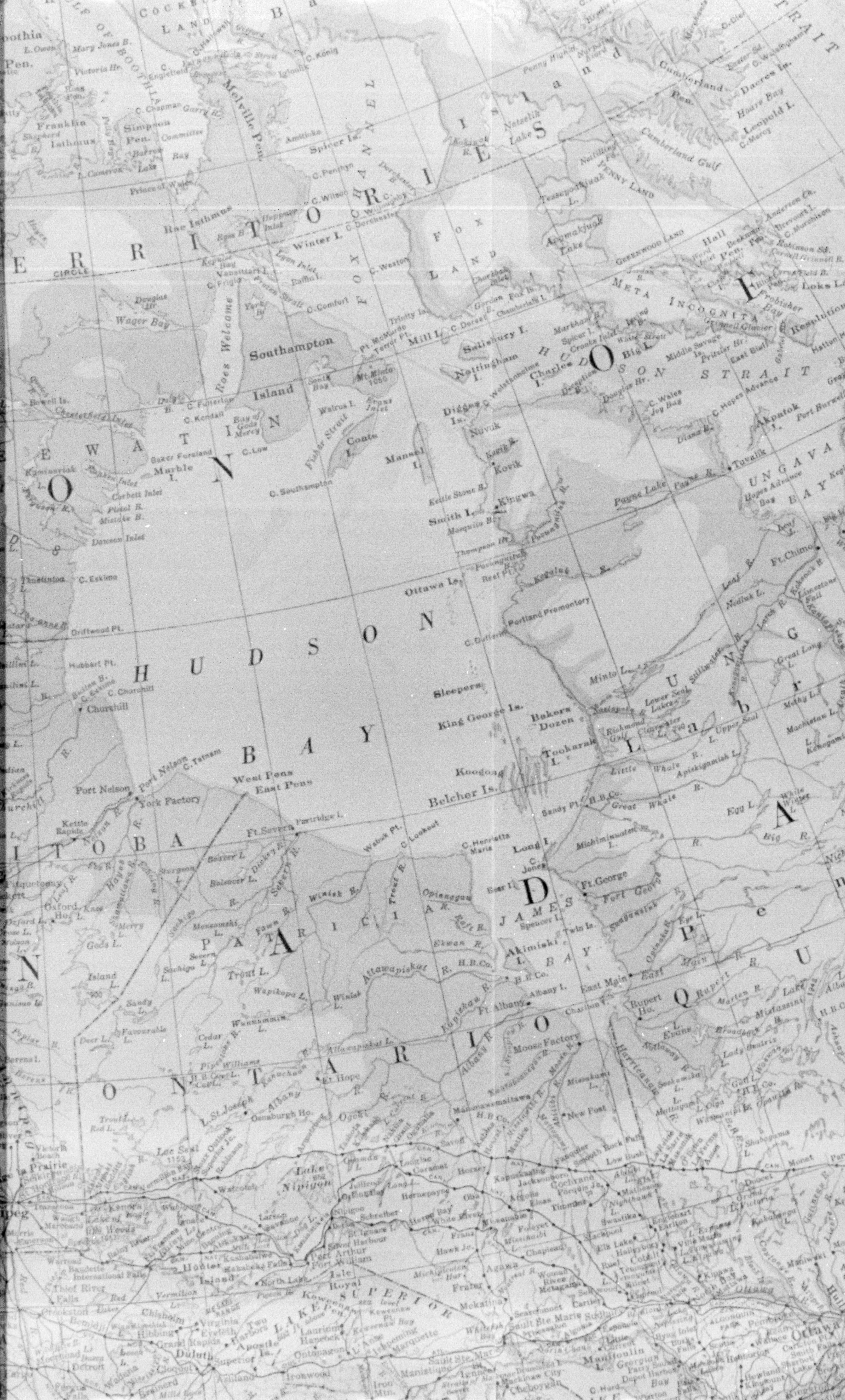

Victoria Island
Prince Albert Sound
Clerk L.
Mt. Arrowsmith
COLVILLE MTS.
WOLLASTON LAND
VICTORIA LAND
Coronation Gulf
Kent Pen.
Coronation
Dismal Lakes
Ft. Epworth
Bathurst Inlet
Hood R.
Great Bear Lake
Norman
Mackenzie R.
Good Hope
Dawson
Ogilvie R.
Peel R.
MACKENZIE MOUNTAINS
Mt. Sekal
Wrigley
L. la Martre
Simpson
Liard R.
Liard
Lower Post
Providence
Great Slave Lake
Resolution
Hay River
Ft. Rae
Buffalo L.
Ft. Smith
Fitzgerald (Smith Landing)
Hill Island Lake
Clinton-Colden L.
L. Aylmer
Mackay Lake
L. de Gras
Ft. Reliance
Artillery L.
Fort Nelson
CARIBOU MTS.
BUFFALO RANGE
Hay River Outpost
Chipewyan
L. Athabaska
Fond du Lac
Black L.
Wollaston L.
Ft. Vermilion
Keg River Outpost
Ft. Grahame
Ft. St. John
Peace River
Spirit River
McLennan
Lesser Slave L.
Grande Prairie
McMurray (Waterways)
MacKay
Cree L.
Foster Lakes
Churchill R.
Lac la Ronge
Ft. McLeod
Ft. St. James
Prince George
Stikine
Hazelton
Port Essington
Prince Rupert
N O R T H W E S T
Y U K O N
D O M I N I O N
M A C K E N Z I E
K E E W A T I N
B R I T I S H
C O L U M B I A
A L B E R T A
S A S K A T C H E W A N
Mt. Robson
Jasper
Edmonton
Vegreville
Vermilion
Wetaskiwin
Lacombe
Red Deer
Lac la Biche
St. Paul
Battleford
North Battleford
Prince Albert
Saskatoon
Kindersley
Hanna
Drumheller
Calgary
Banff
Golden
Kamloops
Vernon
Kelowna
Nelson
Cranbrook
Fernie
Lethbridge
Medicine Hat
Swift Current
Moose Jaw
Regina
Weyburn
Estevan
Vancouver
Victoria
Nanaimo
Juan de Fuca Strait
Seattle
Tacoma
Olympia
Bellingham
Spokane
Yakima
Walla Walla
Portland
Vancouver
Columbia R.
The Dalles
Pendleton
La Grande
W A S H I N G T O N
M O N T A N A
Kalispell
Glacier Park
Havre
Malta
Glasgow
Great Falls
Ft. Benton
Missoula
Lewistown
Deer Lodge
Butte
Anaconda
White Sulphur Springs
Miles City
Glendive
Missouri R.
Lewiston
Moscow



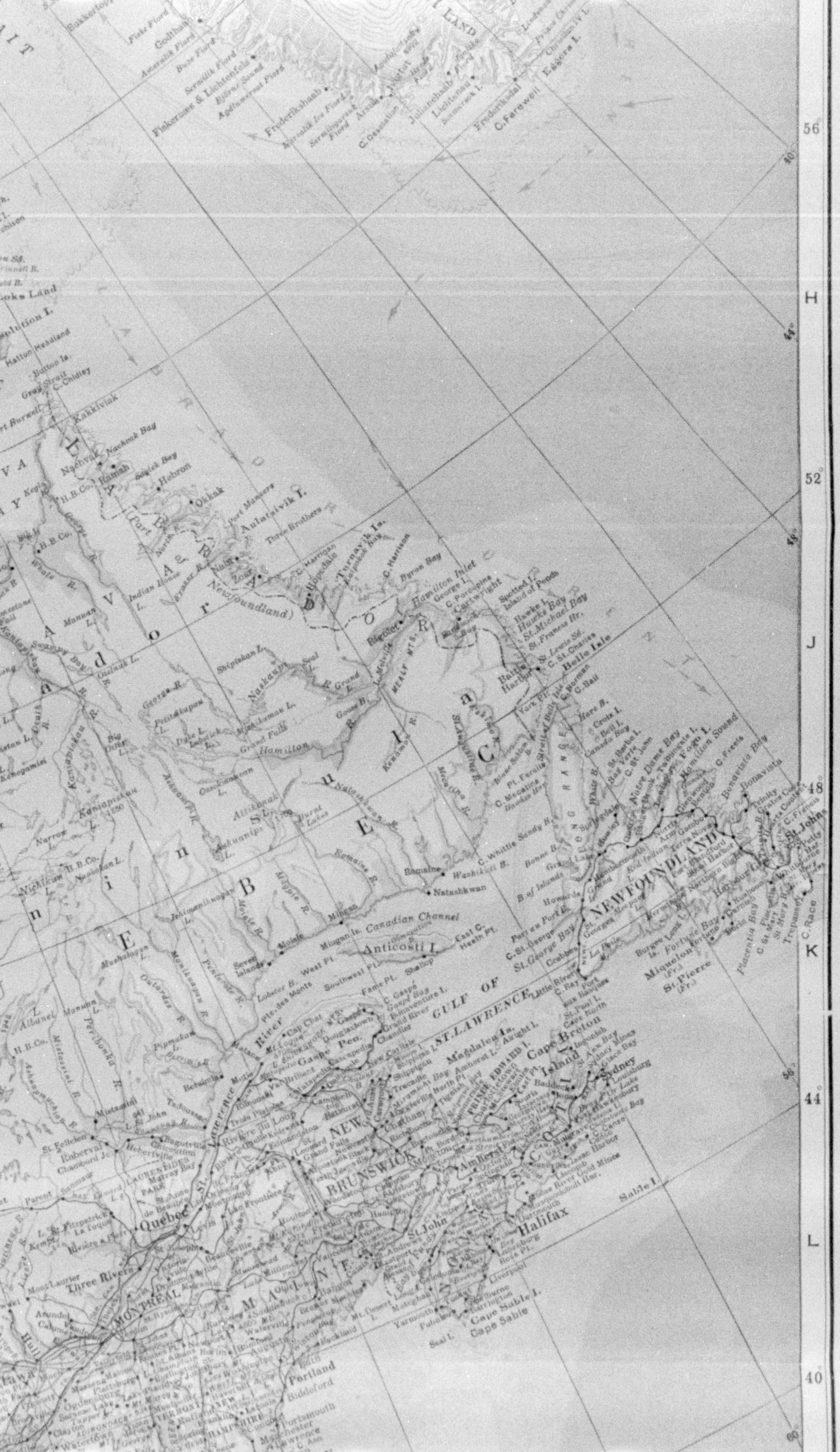
Victoria Island
Prince Albert Sound
Wollaston Land
Victoria Land
Coronation Gulf
Kent Pen.
Dolphin & Union Str.
Coronation
Ft. Epworth
Bathurst Inlet
NORTHWEST TERRITORIES
Great Bear Lake
Mackenzie
Good Hope
Norman
Wrigley
Simpson
Providence
Great Slave Lake
Hay River
Resolution
Ft. Rae
Ft. Reliance
Clinton-Colden L.
L. Aylmer
Mackay Lake
Hill Island Lake
Ft. Smith
Fitzgerald (Smith Landing)
Chipewyan
L. Athabaska
Fond du Lac
Liard
Fort Nelson
MACKENZIE MOUNTAINS
YUKON
BRITISH COLUMBIA
Ft. St. John
Peace River
Grande Prairie
Lesser Slave L.
McMurray (Waterways)
ALBERTA
SASKATCHEWAN
MANITOBA
Reindeer Lake
Cree L.
Wollaston L.
Lac la Biche
Edmonton
Vegreville
Red Deer
Calgary
Banff
Lethbridge
Medicine Hat
Prince Albert
North Battleford
Saskatoon
Moose Jaw
Regina
Swift Current
Yorkton
Prince George
Kamloops
Vancouver
Seattle
Spokane
Glacier Park
Great Falls
Havre
Chinook
Malta
Glasgow
Williston
Minot
Kalispell
MONTANA
NORTH DAKOTA
Helena
Butte
Anaconda
Miles City
Lewistown
Walla Walla
Columbia R.
Missouri R.



Boothia Pen.
Cockburn Land
Gulf of Boothia
Melville Pen.
King William I.
Simpson Pen.
Franklin Isthmus
Committee Bay
Spicer Is.
Fox Channel
Cumberland Pen.
Cumberland Gulf
Nettilling Lake
Penny Land
Fox Land
Amadjuak Lake
Rae Isthmus
Winter I.
Territories
Arctic Circle
Wager Bay
Frozen Strait
C. Comfort
Southampton Island
Mill I.
Salisbury I.
Nottingham I.
Charles I.
Big I.
Hudson Strait
Meta Incognita
Hall Pen.
Mt. Minto 1050
Coats I.
Walrus I.
Evans Inlet
Fisher Strait
Bay of Gods Mercy
Mansel I.
Digges Is.
Keewatin
Chesterfield Inlet
Baker L.
Baker Foreland
Marble I.
Rankin Inlet
Corbett Inlet
Dawson Inlet
C. Southampton
Smith I.
Kingwa
Payne Lake
C. Eskimo
Ottawa Is.
Portland Promontory
Driftwood Pt.
C. Dufferin
Hudson Bay
Hubbart Pt.
C. Churchill
Churchill
Sleepers
King George Is.
Bakers Dozen
Minto L.
Lower Seal Lakes
Ungava
Labrador
Nastapoka
Richmond Gulf
Clearwater L.
Tookarak I.
Koogong
Belcher Is.
Little Whale R.
Great Whale R.
Port Nelson
C. Tatnam
West Pens
East Pens
York Factory
Kettle Rapids
Nelson R.
Hayes R.
Manitoba
Ft. Severn
Partridge L.
Wabuk Pt.
C. Lookout
C. Henrietta Maria
Long I.
Ft. George
Fort George
James Bay
Twin Is.
Akimiski I.
Patricia
Winisk R.
Severn R.
Trout L.
Attawapiskat R.
East Main
Rupert Ho.
Ft. Albany
Albany R.
Moose Factory
Missinaibi R.
Harricanaw R.
Ontario
Quebec
Lake Winnipeg
Norway Ho.
Island L.
Sandy L.
Oxford Ho.
Gods L.
Cedar L.
Pipe Williams
Osnaburgh Ho.
St. Joseph L.
Lac Seul 1153
Lake Nipigon
Nipigon
Long L.
Hearst
Cochrane
Kapuskasing
Timmins
New Post
Lake of the Woods
Kenora
Winnipeg
Brandon
Portage la Prairie
Selkirk
Dauphin
Gypsumville
Fort William
Port Arthur
Isle Royale
Lake Superior
Schreiber
White River
Franz
Chapleau
Sault Ste. Marie
Sudbury
Manitoulin
Georgian Bay
Cobalt
Haileybury
Hunter Island
International Falls
Grand Forks
Crookston
Bemidji
Hibbing
Virginia
Duluth
Superior
Ashland
Ironwood
Marquette
Dakota
Jamestown
Valley City
Fargo
Moorhead
Detroit
Bismarck



HUDSON BAY
JAMES BAY
HUDSON STRAIT
FOX CHANNEL
UNGAVA BAY
Cumberland Gulf
Cumberland Pen.
Frobisher Bay
Resolution
META INCOGNITA
Hall Pen.
Lake Amadjuak
Nettilling L.
Fox Land
Penny Land
Greenwood Land
Southampton Island
Bay of Gods Mercy
Coats I.
Mansel I.
Nottingham I.
Salisbury I.
Charles I.
Big I.
Akpatok I.
Digges Is.
Roes Welcome
Wager Bay
Chesterfield Inlet
Baker Foreland
Marble I.
C. Fullerton
C. Kendall
Rankin Inlet
Corbett Inlet
Dawson Inlet
C. Eskimo
Driftwood Pt.
Hubbert Pt.
Churchill
C. Churchill
Port Nelson
York Factory
C. Tatnam
West Pens
East Pens
Ft. Severn
Belcher Is.
Sleepers
King George Is.
Bakers Dozen
Ottawa Is.
Portland Promontory
C. Dufferin
Long I.
Ft. George
Fort George
Akimiski I.
Twin Is.
Ft. Albany
Albany I.
Moose Factory
East Main
Rupert Ho.
Charlton I.
Trout L.
Attawapiskat R.
Winisk R.
Severn R.
Sandy L.
Cedar L.
Favourable L.
Deer L.
Gods L.
Island L.
Oxford Ho.
Knee L.
Lac Seul
Lake Nipigon
Port Arthur
Fort William
Isle Royale
LAKE SUPERIOR
Duluth
Superior
Apostle Is.
Sault Ste. Marie
Cochrane
Timmins
Chapleau
Hudson
Ft. Chimo
Minto L.
Great Whale R.
Little Whale R.
Lower Seal Lakes
Clearwater L.
Richmond Gulf
Nastapoka
Tookarak I.
Koogong
Mistassini L.
Evans L.
Nottaway R.
Harricanaw R.
Manitoulin I.
Georgian Bay
Ottawa
Melville Pen.
Simpson Pen.
Franklin Isthmus
Boothia Pen.
Rae Isthmus
Winter I.
Spicer Is.
Cockburn Land
K E E W A T I N
O N T A R I O
U N G A V A
L A B R A D O R
Q U E B E C
P A T R I C I A
M A N I T O B A
N O R T H W E S T T E R R I T O R I E S
B A F F I N L A N D
ARCTIC CIRCLE


Sukkertoppen
Godthaab
Fiske Fiord
Ameralik Fiord
Buxe Fiord
Sermilik Fiord
Fiskernaes & Lichtenfels
Bjorne Sound
Agdlumersat Fiord
Frederikshaab
Arsuk
C. Desolation
Julianehaab
Lichtenau
Frederiksdal
C. Farewell
Eggers I.
LAND
Resolution I.
Hatton Headland
Button Is.
Grey Strait
C. Chidley
Port Burwell
Kakkiviak
Nachvak Bay
Nachvak
Ramah
Saglek Bay
Hebron
Okkak
H.B.Co.
Port Manvers
Aulatsivik I.
Three Brothers
Nain
Zoar
Hopedale
C. Harrigan
Turnavik Is.
Kaipokok Bay
C. Harrison
Byron Bay
Hamilton Inlet
George I.
C. Porcupine
Cartwright
Spotted I.
Island of Ponds
Hawke I.
Hawke Bay
St. Michael Bay
St. Francis Hr.
St. Lewis Sd.
C. St. Charles
Battle Harbor
Belle Isle
C. Bauld
C. Norman
Rigolet
Melville L.
MEALY MTS.
Grand L.
Goose B.
Indian House L.
Whale R.
George R.
Naskaupi R.
Seal L.
Shipiskan L.
Michikamau L.
Grand Falls
Hamilton
Ossokmanuan L.
Ashuanipi R.
Attikonak L.
Ashuanipi L.
Burnt Lakes
Romaine R.
Natashkwan R.
Mecatina R.
St. Augustin R.
Eskimo R.
Kenamu R.
Kaniapiskau L.
Kaniapiskau R.
Big Otter L.
Petitsikapau L.
Dyke L.
Otelnuk L.
Swampy Bay
Mannan L.
H.B.Co.
Nichikun L.
Narrow L.
Nuchikun L.
Kenogamisi
Kaniapiskau
L A B R A D O R
N E W Q U E B E C
Newfoundland)
C. Whittle
Sandy Hr.
Pt. Ferolle
C. Mecatina
Brador Bay
Bonne Espérance
Strait of Belle Isle
York Pt.
Hare B.
Croix I.
Bell I.
Canada Bay
St. Barbe I.
Baie Verte
C. St. John
Notre Dame Bay
Twillingate I.
Fogo I.
Hamilton Sound
C. Freels
Bonavista Bay
Bonavista
Trinity
Trinity B.
Grates Cove
C. Francis
St. Johns
Conception Bay
Petty Hr.
Ferryland
St. Mary B.
C. St. Mary
Trepassey
C. Race
Placentia Bay
Placentia
Fortune Bay
Burin
Miquelon (Fr.)
St. Pierre (Fr.)
Burgeo
Ramea Is.
Harbour Breton
Hermitage
Gaultois
NEWFOUNDLAND
LONG RANGE
White B.
Grand Lake
Red Indian L.
Terra Nova
Port Blandford
Glenwood
Bonne B.
B. of Islands
Port au Port B.
C. St. George
St. George Bay
Howards
La Poile
Codroy
C. Ray
Port aux Basques
Little River
Grabbes
St. Paul I.
Cape North
Romaine
Washikuti B.
Natashkwan
Mingan
Mingan Is.
Canadian Channel
Anticosti I.
East C.
Heath Pt.
West Pt.
Southwest Pt.
Fame Pt.
Shallop
Seven Islands
Moisie
Moisie R.
Lobster B.
Pte. des Monts
Tchitogama L.
Outardes R.
Manicouagan R.
Pentecôte R.
Mushalagan L.
Pipmakan L.
Peribonka R.
Mistassini R.
Ashuapmuchuan R.
Albanel L.
Mannan L.
H.B.Co.
Mistassini
St. John
L. St. John
Roberval
Chambord Jc.
Hebertville
St. Felicien
Chicoutimi
Bagotville
Tadoussac
Murray Bay
LAURENTIDES PARK
Parent
Sanmaur
Betsiamis
Matane
River
Cap Chat
Mt. Logan
SHICKSHOCK MTS.
Gaspé
C. Gaspé
Gaspé Bay
Bonaventure I.
Grand River
Chandler
Gaspé Pen.
New Carlisle
Shippigan
Bathurst
Chaleur B.
Campbellton
Dalhousie
Matapedia
Causapscal
Rimouski
Trois Pistoles
Rivière du Loup
Edmundston
Grand Falls
Woodstock
Fredericton
Chatham
Newcastle
Richibucto
Moncton
Amherst
Sackville
Shediac
GULF OF ST. LAWRENCE
Magdalen Is.
Amherst I.
Alright I.
Cape Breton Island
Ingonish
St. Ann Bay
Sydney Mines
Glace Bay
Sydney
Louisburg
Bras d'Or Lake
Port Hawkesbury
C. Canso
Canso
Chedabucto Bay
PRINCE EDWARD I.
Charlottetown
Summerside
North Pt.
East Pt.
Pictou
New Glasgow
Antigonish
Truro
Windsor
Halifax
Sable I.
Sherbrooke
Musquodoboit Hbr.
Guysborough
Isaac Harbor
Gold Mines
Lunenburg
Liverpool
Shelburne
Barrington
Cape Sable I.
Cape Sable
Seal I.
Yarmouth
Digby
Annapolis
St. John
St. Andrews
Eastport
Calais
Machias
Bar Harbor
Mt. Desert I.
Bangor
Waterville
Augusta
Bath
Portland
Biddeford
Portsmouth
Manchester
Concord
Houlton
Moosehead L.
Lake Frontière
St. Pascal
St. Anne de Beaupré
Quebec
Levis
St. Joseph
Beauceville
Thetford
Sherbrooke
Three Rivers
Shawinigan
La Tuque
L. St. Fitzpatrick
Kenogami
Mont Laurier
MONTREAL
St. Johns
Arundel
Hull
Ottawa
Ogdensburg
Malone
Plattsburg
Burlington
St. Albans
Montpelier
Saranac Lake
ADIRONDACK MTS.
Clayton
Watertown
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VERMONT
NEW HAMPSHIRE
H
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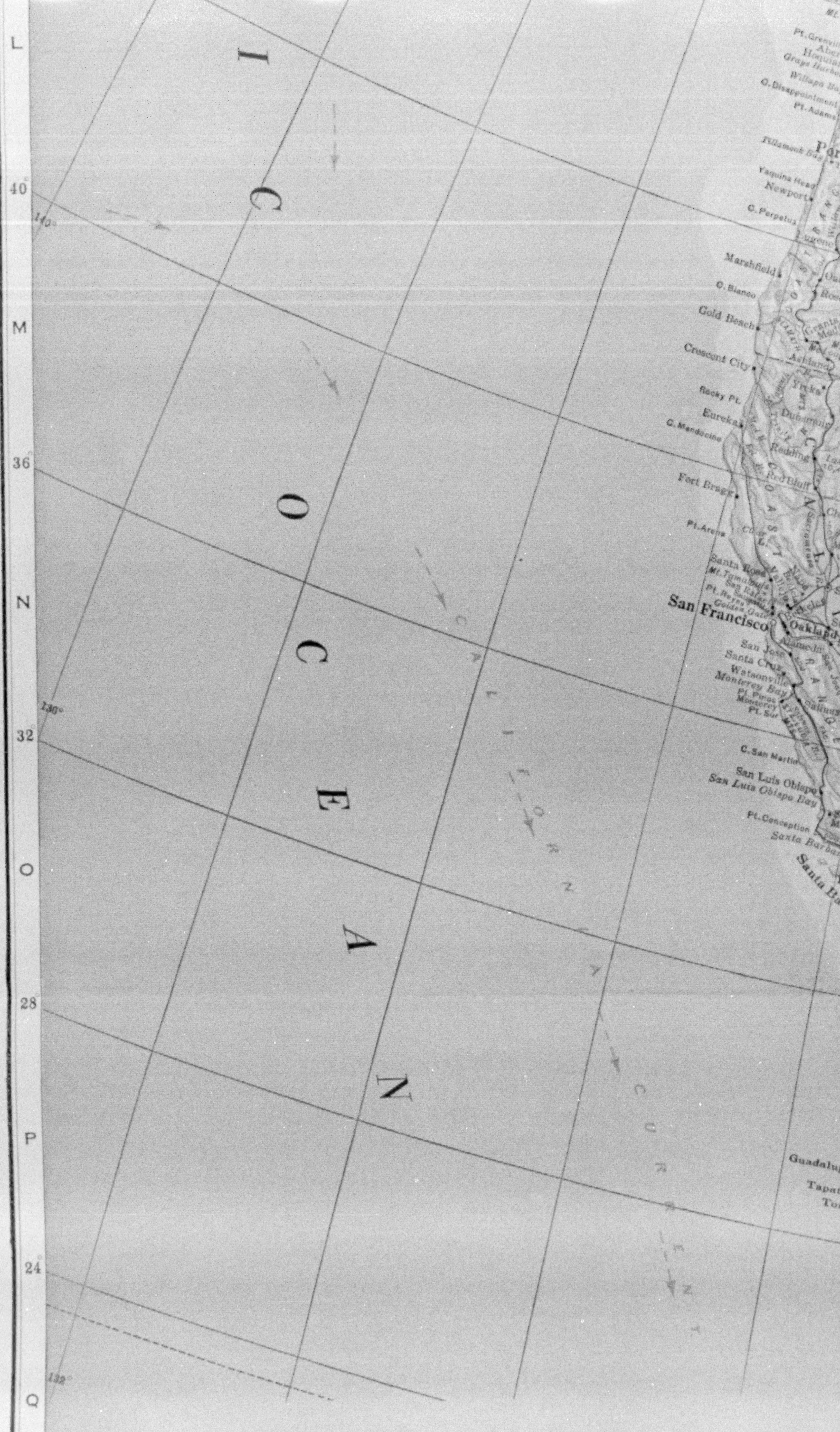
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I
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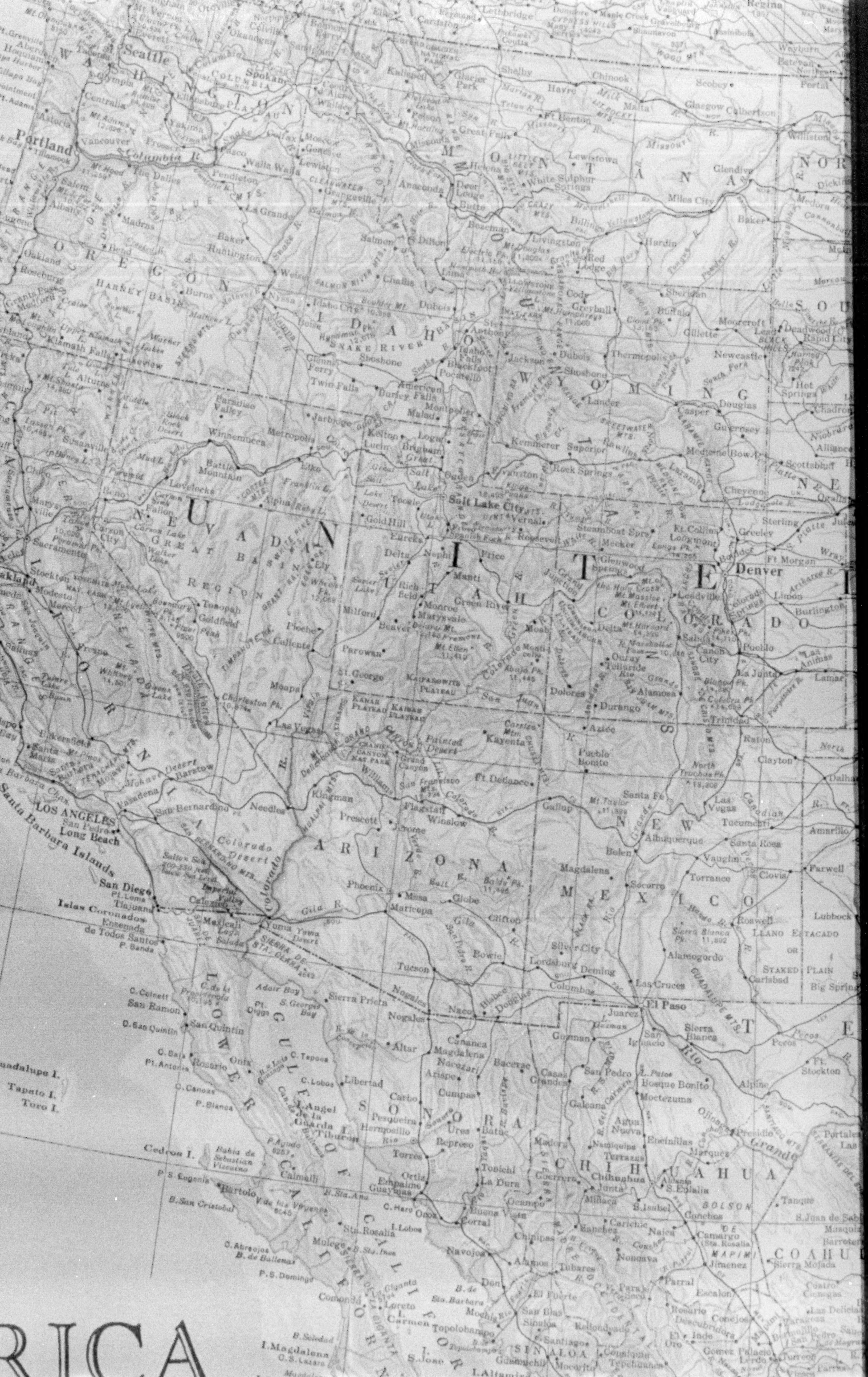
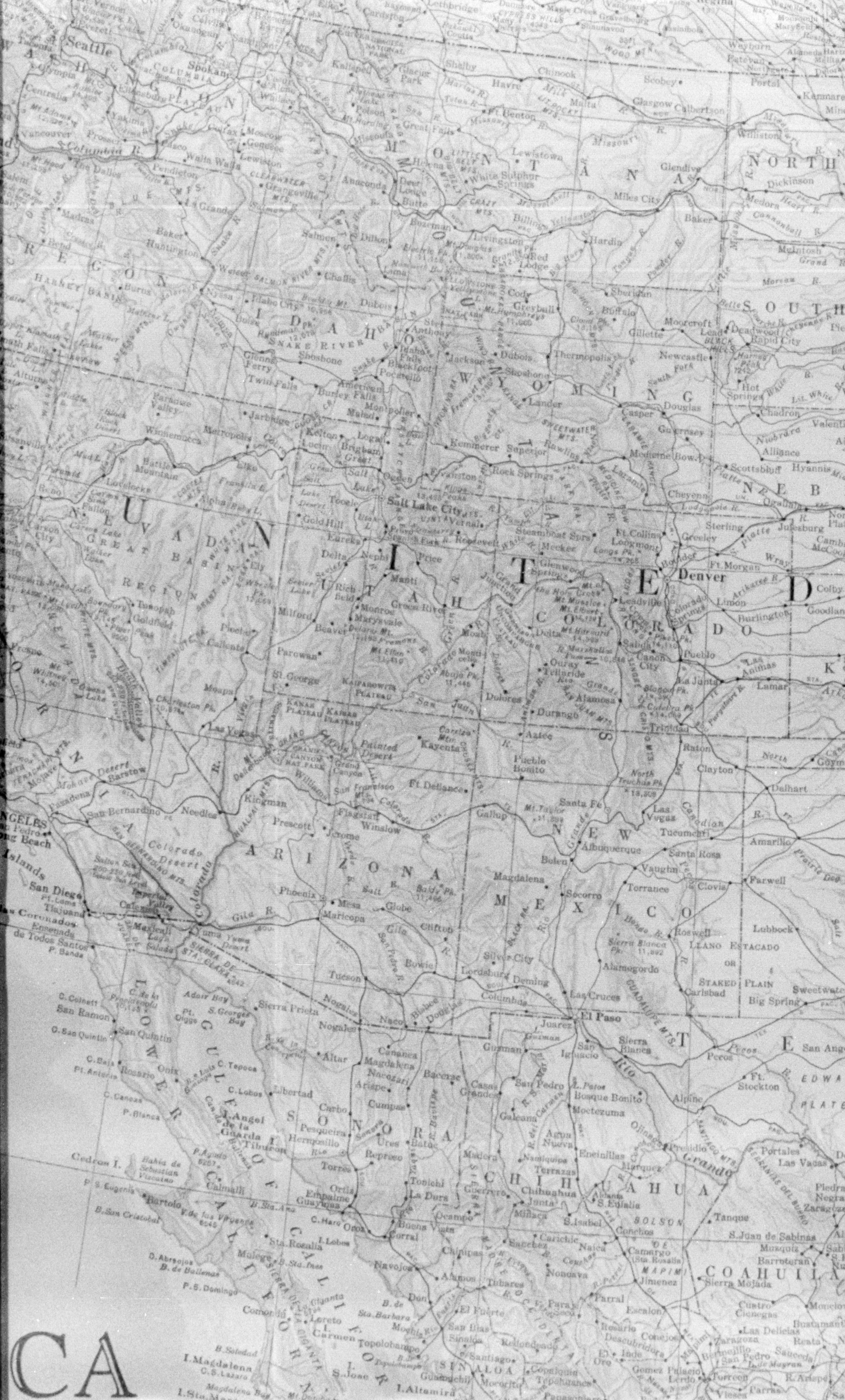
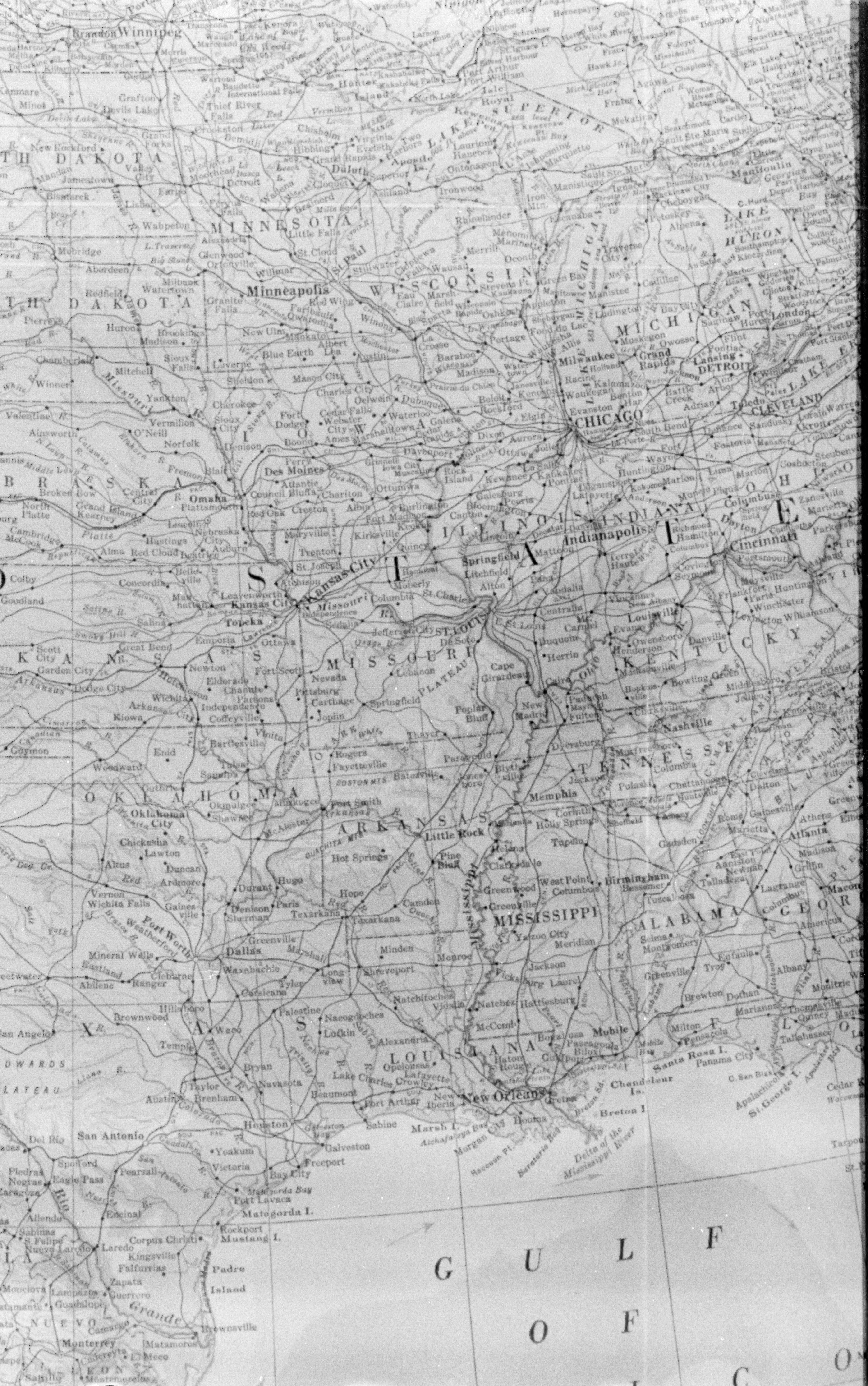
A
N
CALIFORNIA CURRENT
Pt. Grenville
Aberdeen
Hoquiam
Grays Harbor
Willapa Bay
C. Disappointment
Pt. Adams
Tillamook Bay
Yaquina Head
Newport
C. Perpetua
Eugene
Marshfield
C. Blanco
Gold Beach
Crescent City
Ashland
Yreka
Rocky Pt.
Eureka
Dunsmuir
C. Mendocino
Redding
Red Bluff
Fort Bragg
Pt. Arena
Clear L.
Sacramento
Santa Rosa
Mt. Tamalpais
San Rafael
Pt. Reyes
Golden Gate
Vallejo
Benicia
San Francisco
Oakland
Alameda
San Jose
Santa Cruz
Watsonville
Monterey Bay
Pt. Pinos
Monterey
Pt. Sur
Salinas
C. San Martin
San Luis Obispo
San Luis Obispo Bay
Pt. Conception
Santa Barbara
Guadalupe
Tapat
Tor

NORTH AMER

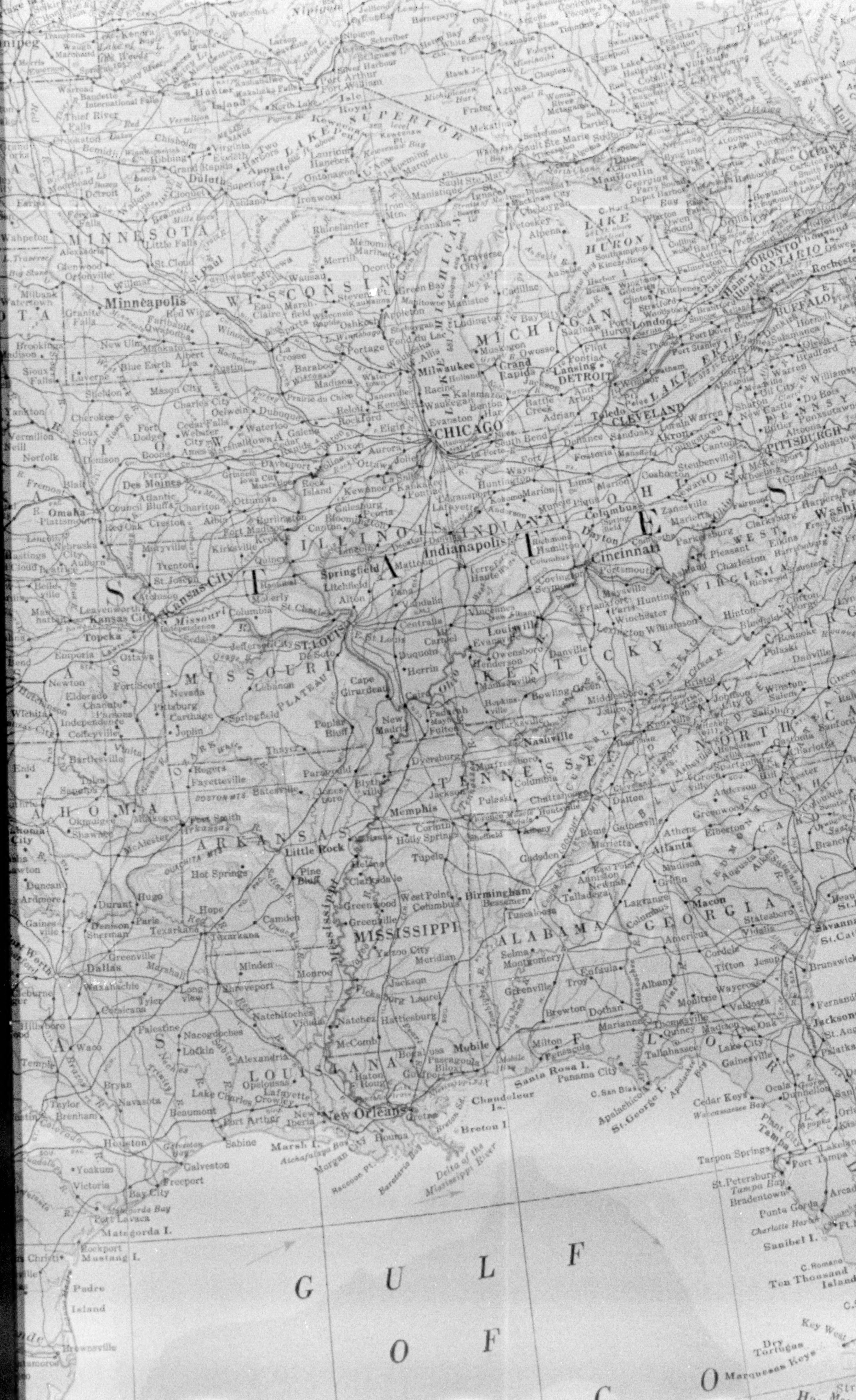


WASHINGTON
Seattle
Spokane
Portland
OREGON
IDAHO
MONTANA
WYOMING
NEVADA
UTAH
Salt Lake City
COLORADO
Denver
CALIFORNIA
Sacramento
Oakland
LOS ANGELES
Long Beach
San Diego
Santa Barbara Islands
ARIZONA
Phoenix
Tucson
NEW MEXICO
Santa Fe
Albuquerque
El Paso
SONORA
CHIHUAHUA
LOWER CALIFORNIA
GULF OF CALIFORNIA
GREAT BASIN REGION
SNAKE RIVER BASIN
Colorado Desert
Painted Desert
LLANO ESTACADO OR STAKED PLAIN
COAHU
RICA

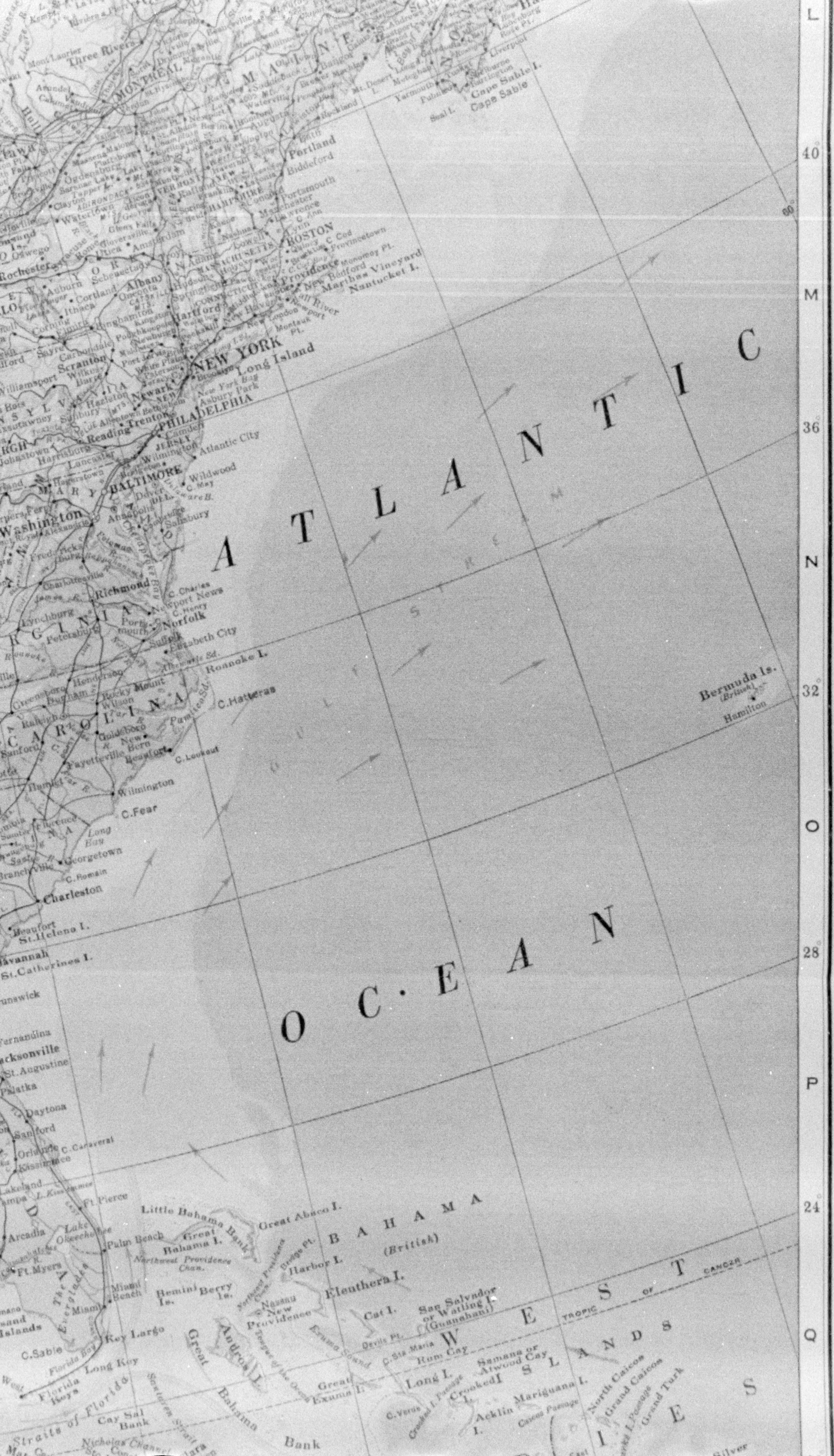

CA
U N I T E D
WASHINGTON
OREGON
IDAHO
MONTANA
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
CALIFORNIA
NORTH
SOUTH
NEB
LOWER CALIFORNIA
GULF OF CALIFORNIA
SONORA
CHIHUAHUA
COAHUILA
Seattle
Spokane
Salt Lake City
Denver
San Diego
El Paso
Phoenix
Tucson
Albuquerque
Santa Fe
Cheyenne
Helena
Boise
Chihuahua
GREAT BASIN REGION
LLANO ESTACADO OR STAKED PLAIN
Colorado Desert
Mohave Desert
Painted Desert
Grand Canyon
Snake River
Colorado R.
Rio Grande
Gila R.



Winnipeg
Brandon
LAKE SUPERIOR
Duluth
Superior
Port Arthur
Fort William
Isle Royal
Sault Ste. Marie
TH DAKOTA
MINNESOTA
Minneapolis
St. Paul
TH DAKOTA
WISCONSIN
MICHIGAN
LAKE HURON
LAKE MICHIGAN
Milwaukee
Grand Rapids
Lansing
DETROIT
CHICAGO
CLEVELAND
Toledo
LAKE ERIE
BRASKA
Omaha
Des Moines
Council Bluffs
Sioux City
I O W A
ILLINOIS
INDIANA
Indianapolis
O H I
Columbus
Cincinnati
Springfield
K A N S A S
Topeka
Kansas City
St. Joseph
ST. LOUIS
MISSOURI
M I S S O U R I
PLATEAU
KENTUCKY
Louisville
Nashville
TENNESSEE
Memphis
OKLAHOMA
Oklahoma City
Tulsa
ARKANSAS
Little Rock
Fort Smith
Hot Springs
OUACHITA MTS.
BOSTON MTS.
O Z A R K
MISSISSIPPI
ALABAMA
Birmingham
Atlanta
GEOR
Dallas
Fort Worth
Waco
Austin
San Antonio
Houston
Galveston
LOUISIANA
New Orleans
Shreveport
Baton Rouge
Mobile
Pensacola
Corpus Christi
Laredo
Brownsville
Monterrey
Matamoros
Rio Grande
NUEVO
LEON
EDWARDS
PLATEAU
Delta of the Mississippi River
Mississippi
Missouri
Red
Arkansas
Ohio
Colorado
Brazos
Padre Island
Mustang I.
Matagorda I.
Chandeleur Is.
Breton I.
Santa Rosa I.
St. George I.
G U L F
O F
M



LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
L. ONTARIO
MINNESOTA
WISCONSIN
MICHIGAN
IOWA
ILLINOIS
INDIANA
OHIO
MISSOURI
KENTUCKY
TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
GEORGIA
LOUISIANA
WEST VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
FLORIDA
PENNSYLVANIA
OKLAHOMA
KANSAS
TEXAS
UNITED STATES
Winnipeg
Lake of the Woods
Duluth
Superior
Fort William
Port Arthur
Isle Royal
Sault Ste Marie
Minneapolis
St. Paul
Milwaukee
CHICAGO
DETROIT
TOLEDO
CLEVELAND
BUFFALO
TORONTO
Ottawa
PITTSBURGH
Indianapolis
Cincinnati
Columbus
Dayton
Louisville
ST. LOUIS
Kansas City
Omaha
Des Moines
Topeka
Springfield
Memphis
Nashville
Chattanooga
Knoxville
Atlanta
Birmingham
Little Rock
Hot Springs
Shreveport
Dallas
Fort Worth
Waco
Houston
Galveston
Beaumont
Port Arthur
New Orleans
Baton Rouge
Mobile
Pensacola
Montgomery
Jackson
Vicksburg
Natchez
Macon
Savannah
Jacksonville
Tallahassee
Tampa
St. Petersburg
OZARK PLATEAU
BOSTON MTS.
OUACHITA MTS.
Delta of the Mississippi River
Mississippi R.
Ohio R.
Red R.
Chandeleur Is.
Breton I.
Santa Rosa I.
St. George I.
Matagorda I.
Mustang I.
Padre Island
Brownsville
Key West
Dry Tortugas
Marquesas Keys
Ten Thousand Islands
Sanibel I.
GULF OF



ATLANTIC
OCEAN
GULF STREAM
L
M
N
O
P
Q
40°
36°
32°
28°
24°
Three Rivers
MONTREAL
MAINE
Portland
Biddeford
Portsmouth
Manchester
Lawrence
Lowell
Lynn
BOSTON
C. Cod
Provincetown
Plymouth
Providence
New Bedford
Fall River
Newport
Martha's Vineyard
Nantucket I.
Monomoy Pt.
Yarmouth
Cape Sable I.
Cape Sable
Seal I.
Liverpool
Mt. Desert I.
Rockland
Bangor
Augusta
Waterville
Ogdensburg
Plattsburg
Watertown
Oswego
Rochester
Syracuse
Utica
Rome
Gloversville
Amsterdam
Schenectady
Albany
Troy
Oneonta
Cortland
Ithaca
Auburn
Elmira
Corning
Binghamton
Kingston
Poughkeepsie
Newburgh
Hartford
Springfield
New Haven
New London
Montauk Pt.
CONNECTICUT
MASSACHUSETTS
NEW HAMPSHIRE
VERMONT
NEW YORK
Brooklyn
Long Island
New York Bay
Asbury Park
Newark
Trenton
PHILADELPHIA
Camden
Atlantic City
Wildwood
C. May
Delaware B.
NEW JERSEY
Scranton
Wilkes Barre
Carbondale
Hazleton
Sunbury
Williamsport
Sayre
Reading
Allentown
Bethlehem
Harrisburg
Lancaster
Johnstown
PENNSYLVANIA
Hagerstown
Wilmington
BALTIMORE
Annapolis
Dover
DEL.
Salisbury
Washington
Alexandria
Fredericksburg
Charlottesville
Richmond
Lynchburg
Petersburg
Roanoke
VIRGINIA
C. Charles
C. Henry
Newport News
Norfolk
Portsmouth
Suffolk
Elizabeth City
Albemarle Sd.
Roanoke I.
Pamlico Sd.
C. Hatteras
C. Lookout
Henderson
Rocky Mount
Wilson
Greensboro
Durham
Raleigh
Goldsboro
New Bern
Beaufort
Fayetteville
Sanford
NORTH CAROLINA
Wilmington
C. Fear
Long Bay
Florence
Georgetown
C. Romain
Charleston
Branchville
Beaufort
St. Helena I.
Savannah
St. Catherines I.
Brunswick
Fernandina
Jacksonville
St. Augustine
Palatka
Daytona
Sanford
Orlando
C. Canaveral
Kissimmee
Lakeland
Tampa
L. Kissimmee
Ft. Pierce
Arcadia
Lake Okeechobee
Palm Beach
Ft. Myers
The Everglades
Miami
Miami Beach
Key Largo
C. Sable
Florida Bay
Long Key
Florida Keys
Straits of Florida
Cay Sal Bank
Nicholas Channel
Bermuda Is.
(British)
Hamilton
Little Bahama Bank
Great Bahama I.
Great Abaco I.
Northwest Providence Chan.
Bimini Is.
Berry Is.
Harbor I.
BAHAMA
(British)
Eleuthera I.
Nassau
New Providence
Andros I.
Great Bahama Bank
Tongue of the Ocean
Exuma Sound
Great Exuma I.
Cat I.
San Salvador or Watling I. (Guanahani)
Rum Cay
Long I.
Crooked I.
Acklin I.
Samana or Atwood Cay
Mariguana I.
North Caicos
Grand Caicos
Grand Turk
Crooked I. Passage
Caicos Passage
C. Verde
TROPIC OF CANCER
WEST INDIES
ISLANDS

NORTH AMERI

PREPARED ESPECIALLY FOR

THE NATIONAL GEOGRAPHIC MAG

GILBERT GROSVENOR, *Editor*

Scale 1 : 10,000,000 or 157.82 miles to one inch

AZIMUTHAL EQUIDISTANT PROJECTION

Pole of Projection: Latitude 45°, Longitude 100°

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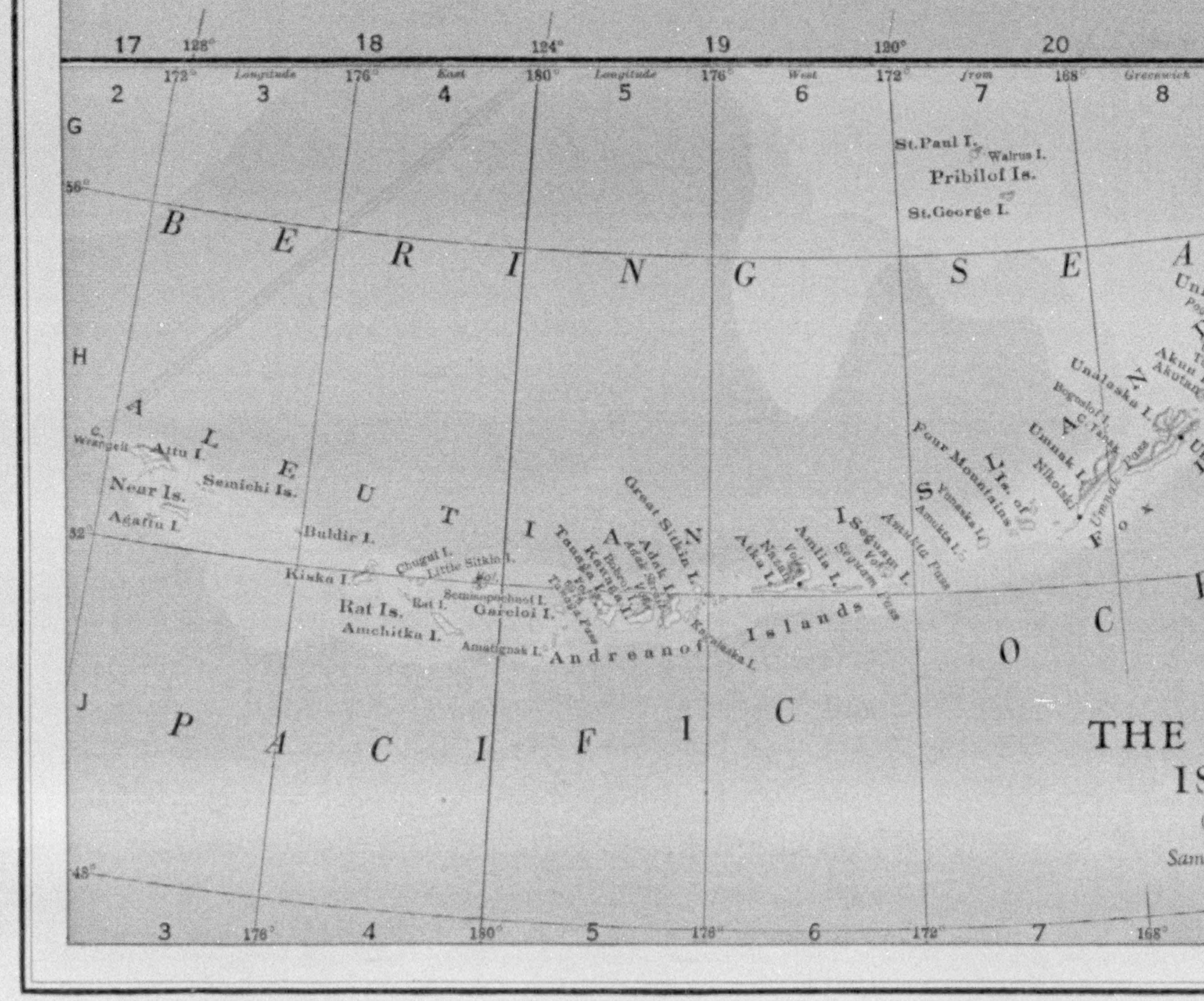
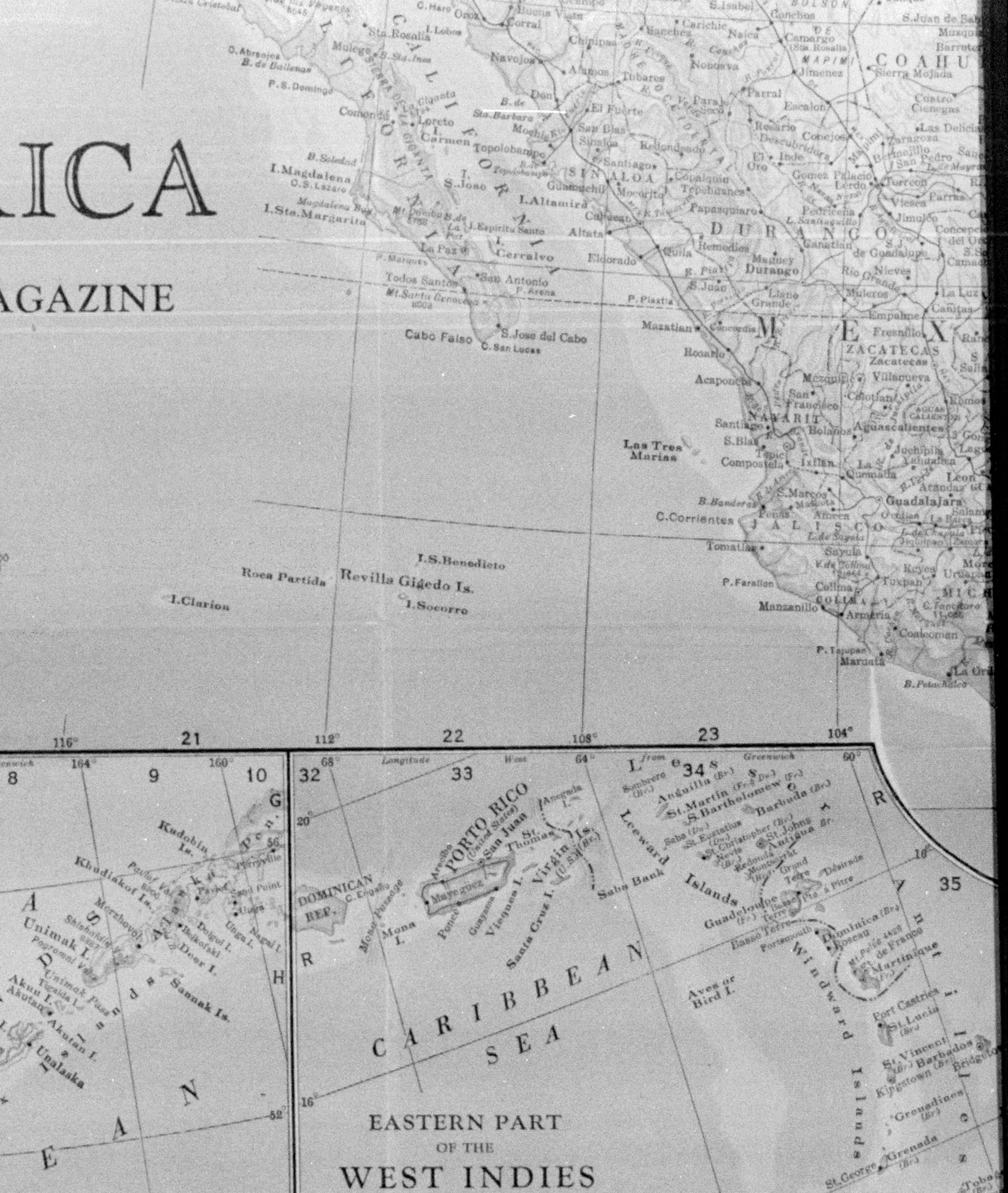
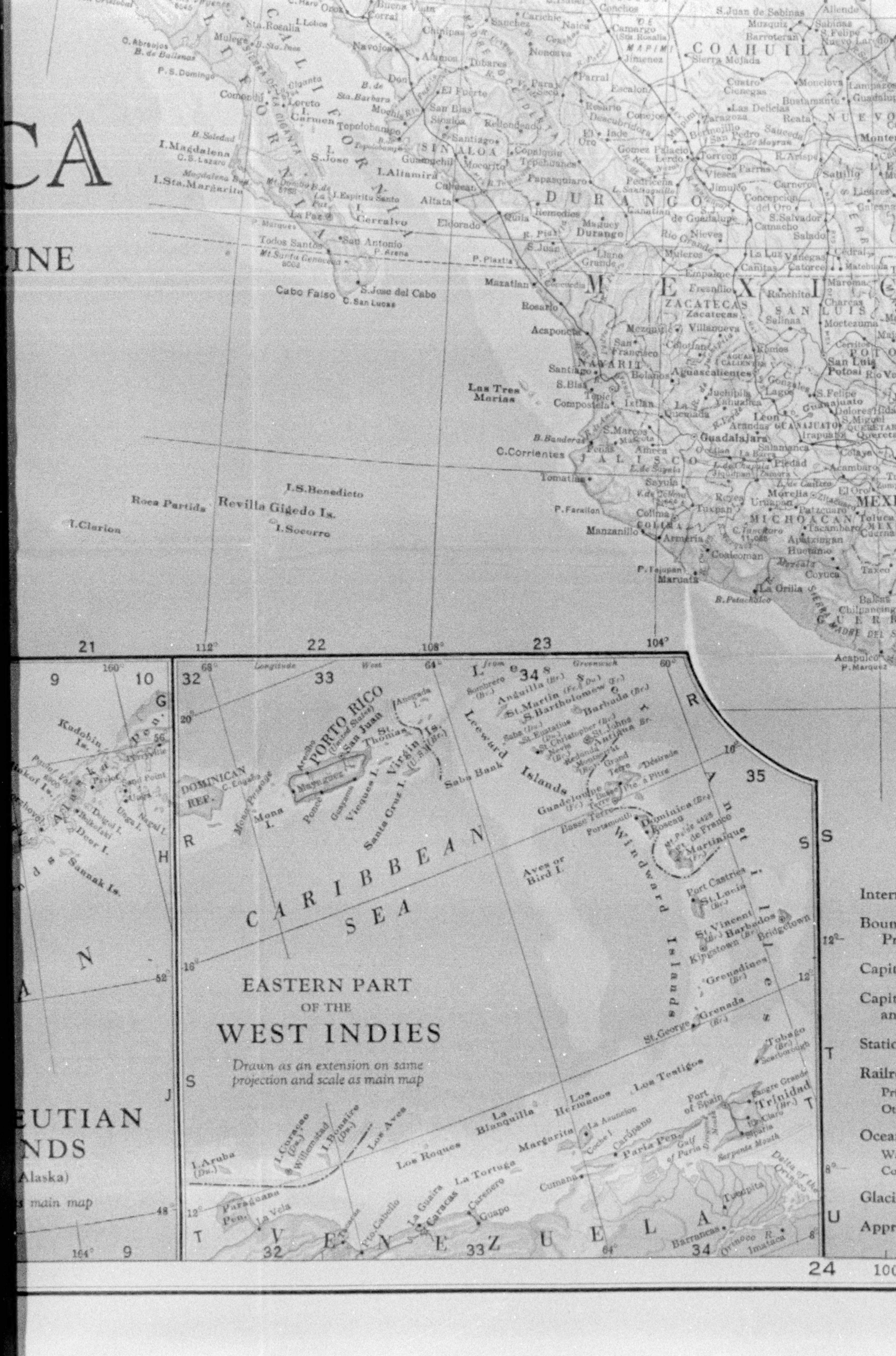
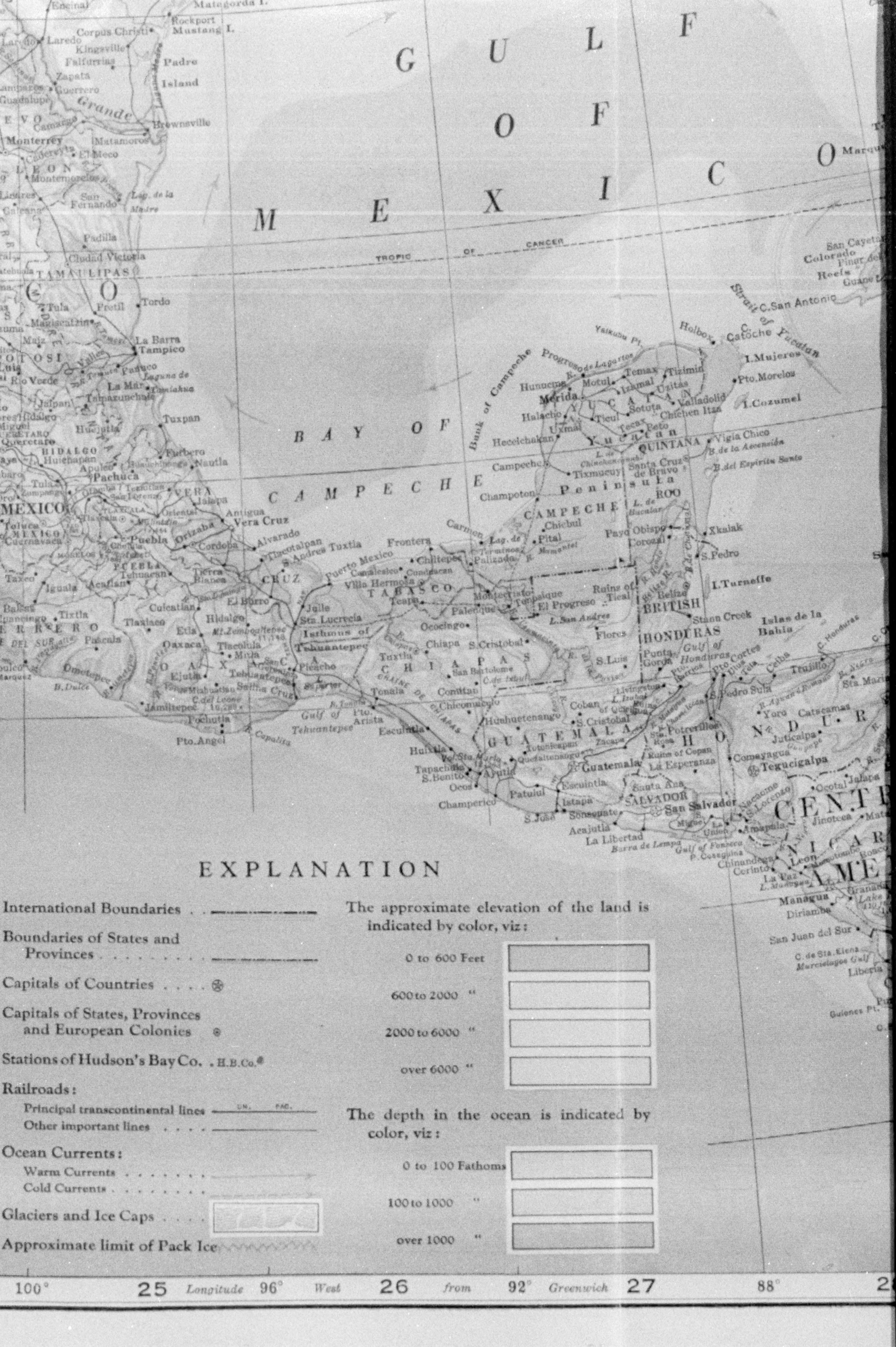

Statute Miles
Kilometers
Nautical Miles
Longitude East
Longitude West from Greenwich
BERING SEA
St.Paul I.
Walrus I.
Pribilof Is.
St.George I.
ALEUTIAN ISLANDS
C. Wrangell
Attu I.
Near Is.
Semichi Is.
Agattu I.
Buldir I.
Kiska I.
Chugul I.
Little Sitkin I.
Semisopochnoi I.
Rat Is.
Rat I.
Gareloi I.
Amchitka I.
Amatignak I.
Great Sitkin I.
Adak I.
Kanaga I.
Tanaga I.
Andreanof Islands
Atka I.
Amlia I.
Seguam I.
Seguam Pass
Amukta Pass
Amukta I.
Yunaska I.
Four Mountains
Umnak I.
Bogoslof I.
Unalaska I.
Akun I.
Akutan
Nikolski
Umnak Pass
PACIFIC OCEAN
THE
IS
Sam

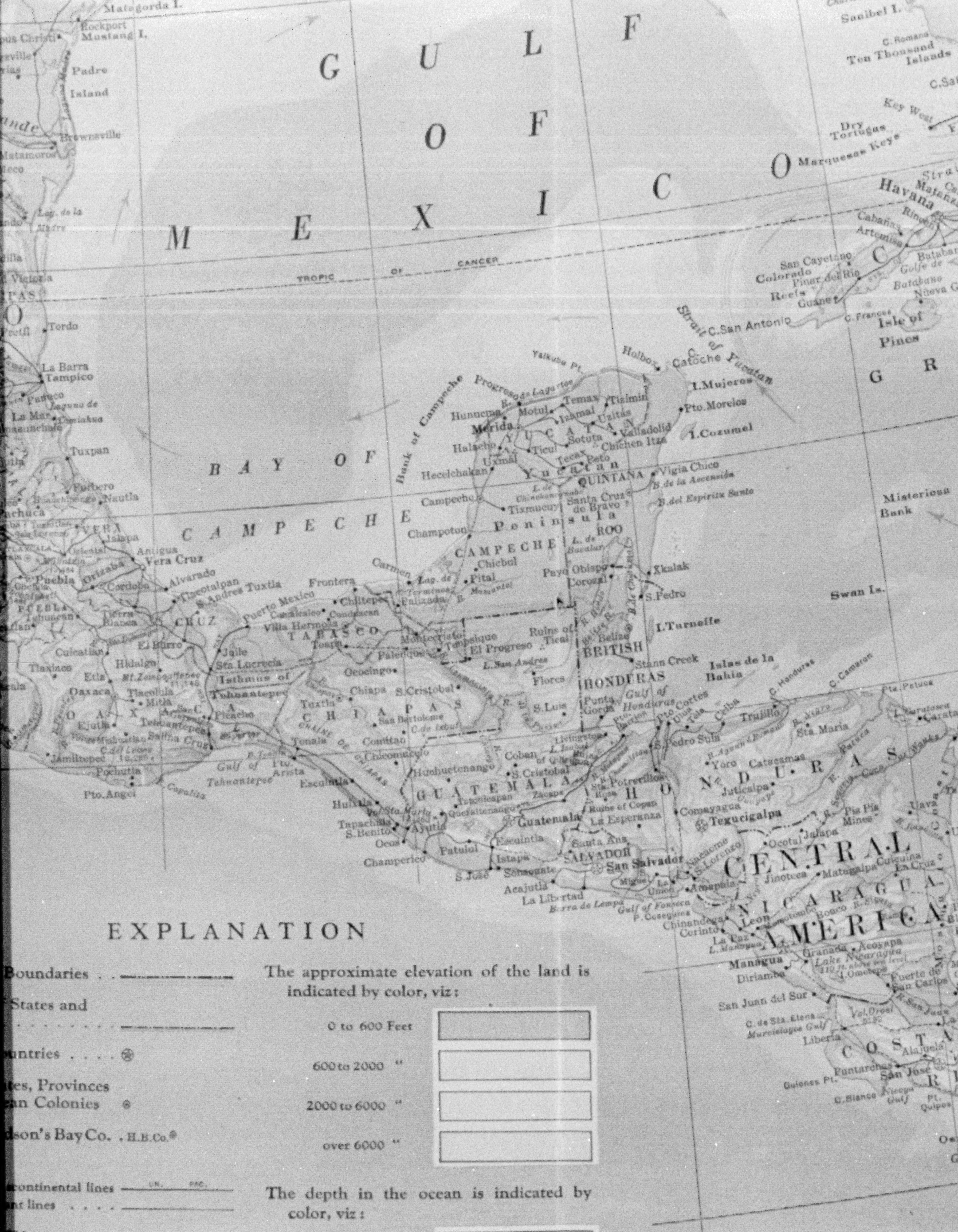

ICA
AGAZINE
EASTERN PART
OF THE
WEST INDIES
Drawn as an extension on same projection and scale as main map
HE ALEUTIAN
ISLANDS
(Part of Alaska)
Same scale as main map
CARIBBEAN SEA
PORTO RICO
(United States)
San Juan
Mayaguez
Ponce
DOMINICAN REP.
Mona I.
Virgin Is.
Leeward Islands
Windward Islands
Guadeloupe
Dominica
Martinique
St. Lucia
St. Vincent
Barbados
Grenada
Trinidad
Tobago
Port of Spain
Curaçao
Bonaire
Aruba
Margarita
V E N E Z U E L A
Caracas
La Guaira
Cumana
Los Roques
La Blanquilla
Los Hermanos
Los Testigos
Aves or Bird I.
Unimak I.
Unalaska
Sannak Is.
Kudobin Is.
Khodiakof Is.
Revilla Gigedo Is.
I.S.Benedicto
I.Socorro
I.Clarion
Roca Partida
Los Tres Marias
Cabo Falso
S.Jose del Cabo
C.San Lucas
La Paz
Todos Santos
I.Magdalena
I.Sta.Margarita
Mazatlan
Durango
DURANGO
SINALOA
NAYARIT
JALISCO
ZACATECAS
COLIMA
Guadalajara
Aguascalientes
Zacatecas
Tepic
Colima
Manzanillo
C.Corrientes
Torreon
Parral
Culiacan
Topolobampo
COAHU
M E X
21
22
23
32
33
34
35
116°
112°
108°
104°
164°
160°
68°
64°
60°

XUM

CA
INE
MEXICO
COAHUILA
DURANGO
SINALOA
ZACATECAS
SAN LUIS POTOSI
NAYARIT
JALISCO
MICHOACAN
GUANAJUATO
AGUASCALIENTES
BAJA CALIFORNIA
Las Tres Marias
Revilla Gigedo Is.
I.S.Benedicto
I.Socorro
Roca Partida
I.Clarion
Cabo Falso
S.Jose del Cabo
Mazatlan
Durango
Guadalajara
Acapulco
21
22
23
24
112°
108°
104°
EASTERN PART
OF THE
WEST INDIES
Drawn as an extension on same projection and scale as main map
CARIBBEAN SEA
PORTO RICO (United States)
San Juan
DOMINICAN REP.
Virgin Is.
Leeward Islands
Windward Islands
Guadeloupe
Dominica
Martinique
St.Lucia
St.Vincent
Barbados
Grenada
Tobago
Trinidad
Port of Spain
VENEZUELA
Caracas
Aves or Bird I.
32
33
34
35
ALEUTIAN ISLANDS
(Alaska)
main map
Interr
Boun
Capit
Statio
Railr
Ocea
Glaci
Appr
XUM


GULF OF MEXICO
BAY OF CAMPECHE
TROPIC OF CANCER
Corpus Christi
Rockport
Mustang I.
Kingsville
Padre Island
Brownsville
Laredo
Monterrey
Matamoros
Ciudad Victoria
TAMAULIPAS
Tampico
San Luis Potosi
Pachuca
Queretaro
HIDALGO
MEXICO
Toluca
Cuernavaca
Puebla
Orizaba
Tlaxcala
Vera Cruz
Jalapa
Tuxpan
Alvarado
Cordoba
Tehuacan
Oaxaca
OAXACA
Tehuantepec
Salina Cruz
Isthmus of Tehuantepec
Gulf of Tehuantepec
Pto. Angel
Puerto Mexico
Frontera
TABASCO
Villa Hermosa
Carmen
Lag. de Terminos
CAMPECHE
Campeche
Champoton
Merida
Progreso
YUCATAN
Yucatan Peninsula
Valladolid
Chichen Itza
Uxmal
QUINTANA ROO
Santa Cruz de Bravo
Bank of Campeche
Strait of Yucatan
C. San Antonio
C. Catoche
I. Mujeres
I. Cozumel
Payo Obispo
CHIAPAS
Tuxtla
S. Cristobal
Tapachula
Palenque
Ruins of Tical
Flores
Belize
BRITISH HONDURAS
Stann Creek
Gulf of Honduras
Islas de la Bahia
GUATEMALA
Guatemala
Quezaltenango
Coban
S. Jose
Champerico
SALVADOR
San Salvador
La Libertad
Acajutla
Gulf of Fonseca
HONDURAS
Tegucigalpa
Comayagua
Pto. Cortes
Trujillo
NICARAGUA
Leon
Managua
Granada
San Juan del Sur
CENTRAL AMERICA
EXPLANATION
International Boundaries
Boundaries of States and Provinces
Capitals of Countries ⊛
Capitals of States, Provinces and European Colonies ⊙
Stations of Hudson's Bay Co. H.B.Co.
Railroads:
Principal transcontinental lines UN. PAC.
Other important lines
Ocean Currents:
Warm Currents
Cold Currents
Glaciers and Ice Caps
Approximate limit of Pack Ice
The approximate elevation of the land is indicated by color, viz:
0 to 600 Feet
600 to 2000 "
2000 to 6000 "
over 6000 "
The depth in the ocean is indicated by color, viz:
0 to 100 Fathoms
100 to 1000 "
over 1000 "
100°
25
Longitude 96° West
26
from 92° Greenwich
27
88°

XUM


GULF OF MEXICO
BAY OF CAMPECHE
TROPIC OF CANCER
Yucatan Peninsula
CAMPECHE
QUINTANA ROO
TABASCO
CHIAPAS
VERA CRUZ
OAXACA
Isthmus of Tehuantepec
Gulf of Tehuantepec
BRITISH HONDURAS
Gulf of Honduras
GUATEMALA
SALVADOR
HONDURAS
NICARAGUA
CENTRAL AMERICA
COSTA RICA
Strait of Yucatan
Isle of Pines
Havana
Merida
Progreso
Campeche
Vera Cruz
Tampico
Tuxpan
Brownsville
Matamoros
Padre Island
Corpus Christi
Rockport
Mustang I.
Matagorda I.
Sanibel I.
Ten Thousand Islands
Key West
Dry Tortugas
Marquesas Keys
C. San Antonio
Catoche
I. Mujeres
I. Cozumel
Belize
Tegucigalpa
Guatemala
San Salvador
Managua
Lake Nicaragua
Gulf of Fonseca
Swan Is.
Islas de la Bahia
Misteriosa Bank
EXPLANATION
Boundaries
States and
untries
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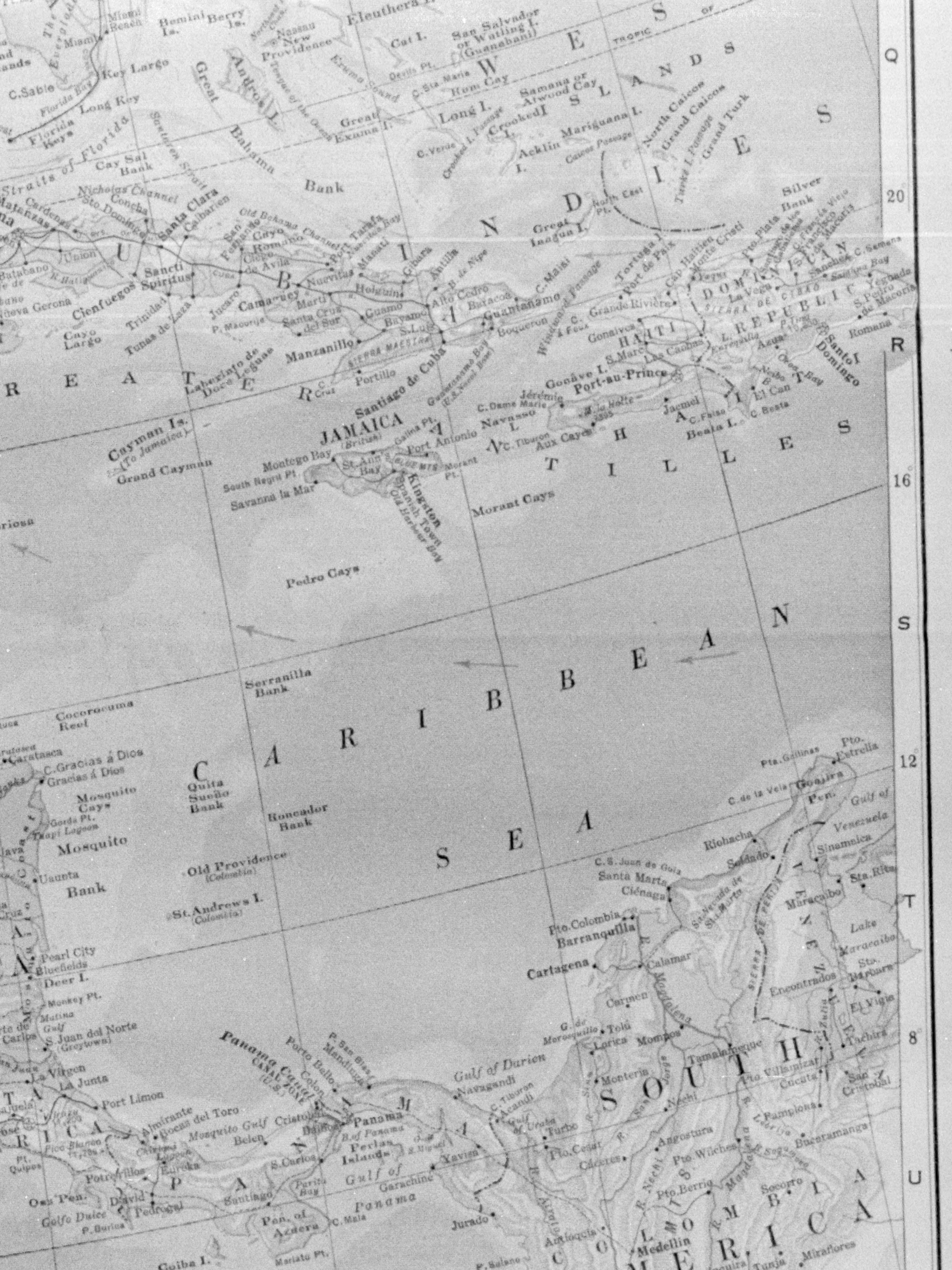
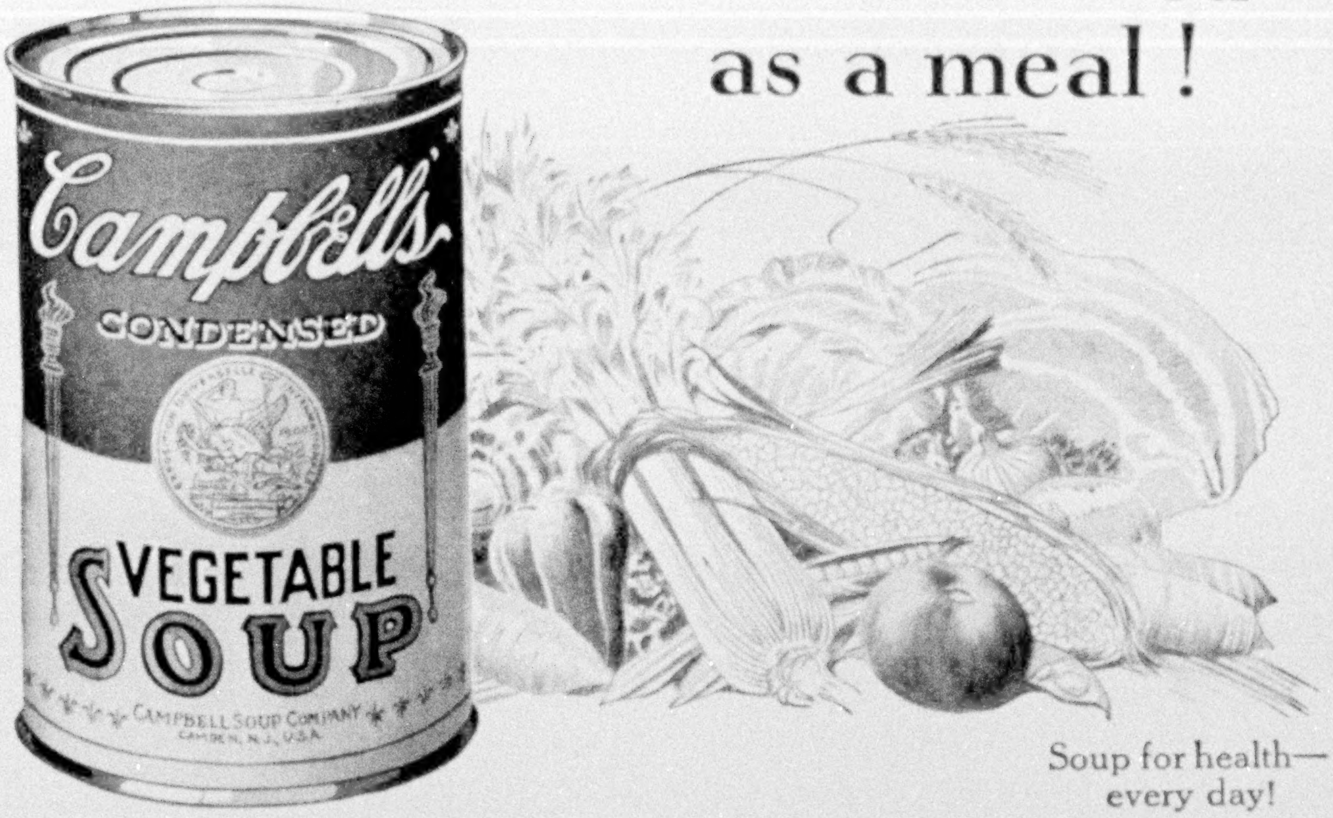
an Colonies
dson's Bay Co. H.B.Co.
continental lines
nt lines
ts:
e Caps
imit of Pack Ice
The approximate elevation of the land is indicated by color, viz:
0 to 600 Feet
600 to 2000 "
2000 to 6000 "
over 6000 "
The depth in the ocean is indicated by color, viz:
0 to 100 Fathoms
100 to 1000 "
over 1000 "
25 Longitude 96° West 26 from 92° Greenwich 27 88° 28


W E S T I N D I E S
G R E A T E R A N T I L L E S
C A R I B B E A N S E A
SOUTH AMERICA
COLOMBIA
VENEZUELA
PANAMA
COSTA RICA
Cuba
HAITI
DOMINICAN REPUBLIC
JAMAICA (British)
Miami Beach
Miami
Bemini Is.
Berry Is.
Nassau
New Providence
Eleuthera I.
Cat I.
San Salvador or Watling I. (Guanahani)
Andros I.
Great Bahama Bank
Exuma Sound
Great Exuma I.
Rum Cay
Long I.
Samana or Atwood Cay
Crooked I.
Acklin I.
Mariguana I.
Caicos Passage
North Caicos
Grand Caicos
Turks I. Passage
Grand Turk
Silver Bank
Key Largo
C. Sable
Florida Bay
Long Key
Florida Keys
Straits of Florida
Cay Sal Bank
Santaren Strait
Tongue of the Ocean
Nicholas Channel
Old Bahama Channel
Cardenas
Matanzas
Sto. Domingo
Concha
Santa Clara
Caibarien
San Fernando
Cayo Romano
Union
Batabano
Sancti Spiritus
Cienfuegos
Trinidad
Tunas de Zaza
Nueva Gerona
Cayo Largo
Ciego de Avila
Jucaro
Camaguey
Nuevitas
Manati
Puerto Padre
Holguin
Gibara
Antilla
B. de Nipe
Santa Cruz del Sur
Marti
Guamo
Bayamo
Manzanillo
Alto Cedro
Baracoa
Guantanamo
C. Maisi
Windward Passage
Sierra Maestra
S. Luis
Santiago de Cuba
Guantanamo Bay
Portillo
C. Cruz
Laberinto de Doce Leguas
Cayman Is. (To Jamaica)
Grand Cayman
Great Inagua I.
North East Pt.
Tortuga I.
Port de Paix
Cap Haitien
Monte Cristi
Pto. Plata
La Vega
Sanchez
C. Samana
Samana Bay
S. Pedro de Macoris
Romana
Santo Domingo
Azua
Ocoa Bay
Sierra de Cibao
Grande Riviere
Gonaives
St. Marc
Las Cahobas
Port-au-Prince
Gonave I.
Jeremie
C. Dame Marie
Jacmel
C. Falso
Beata I.
C. Beata
El Can
Navasso I.
C. Tiburon
Aux Cayes
Montego Bay
St. Ann's Bay
Port Antonio
Morant Pt.
Kingston
Spanish Town
Old Harbour Bay
Blue Mts.
South Negril Pt.
Savanna la Mar
Morant Cays
Pedro Cays
Serranilla Bank
Cocorocuma Reef
Caratasca
C. Gracias á Dios
Gracias á Dios
Mosquito Cays
Gorda Pt.
Mosquito Bank
Quita Sueño Bank
Roncador Bank
Old Providence (Colombia)
St. Andrews I. (Colombia)
Uaunta
Pearl City
Bluefields
Deer I.
Monkey Pt.
S. Juan del Norte (Greytown)
La Virgen
La Junta
Port Limon
Almirante
Bocas del Toro
Chiriqui Lagoon
Mosquito Gulf
Belen
Cristobal
Colon
Porto Bello
Panama Canal
Canal Zone (U.S.)
P. San Blas
Mandinga
Panama
Balboa
B. of Panama
Perlas Islands
G. of S. Miguel
Yavisa
Garachine
Gulf of Panama
Parita Bay
Santiago
S. Carlos
Potrerillos
Eureka
David
Pedregal
Golfo Dulce
P. Burica
Pt. Quipos
Osa Pen.
Pen. of Azuera
C. Mala
Mariato Pt.
Coiba I.
Gulf of Darien
Navagandi
C. Tiburon
Acandi
Gulf of Uraba
Turbo
Pto. Cesar
Jurado
P. Solano
Quibdo
B. Coqui
C. Corrientes
Baudo
Pto. Chirambira
Buenaventura
Pta. Gallinas
Pto. Estrella
C. de la Vela
Goajira Pen.
Gulf of Venezuela
Riohacha
Soldado
Sinamaica
Sta. Rita
Maracaibo
Lake Maracaibo
C. S. Juan de Guia
Santa Marta
Ciénaga
Sierra Nevada de Sta. Marta
Sierra de Perija
Pto. Colombia
Barranquilla
Cartagena
Calamar
Carmen
R. Magdalena
Encontrados
Sta. Barbara
El Vigia
R. Zulia
G. de Morosquillo
Tolú
Lorica
Mompos
Tamalameque
Pto. Villamizar
Tachira
Cucuta
San Cristobal
Monteria
Nechi
Pamplona
Bucaramanga
Cáceres
Angostura
Pto. Wilches
Pto. Berrio
Socorro
R. Atrato
R. Nechi
Antioquia
Medellin
Chiquinquira
Tunja
Miraflores
Honda
Manizales
Vol. Tolima 18,432
R. Cauca
Ibagué
La Mesa
Bogota
Villavicencio
R. Ariari
R. San Juan
Tropic of Cancer
Q
R
S
T
U
V
20
16
12
8°
4°
84°
29
80°
30
76°
31
XUM

The soup which is also served as a meal!



Soup for health—
every day!

Baby lima beans, the very pick of the gardens. Dainty peas, sweet and tempting. Country Gentleman corn. Tomatoes bathed in sunshine and red-ripened on the vines.

Sweet potatoes and white potatoes selected to meet the strict Campbell's standard. Chantenay carrots, the world's best. Turnips. Chopped celery and cabbage. Okra, for its delicious flavor.

Alphabet macaroni. Plump grains of choice barley. A touch of onion and leek, just to season. Fresh herbs grown on our own farms all the year round.

And all blended in Campbell's Vegetable Soup with a rich broth of beef—invigorating, appetizing, builder of strength and good digestion!

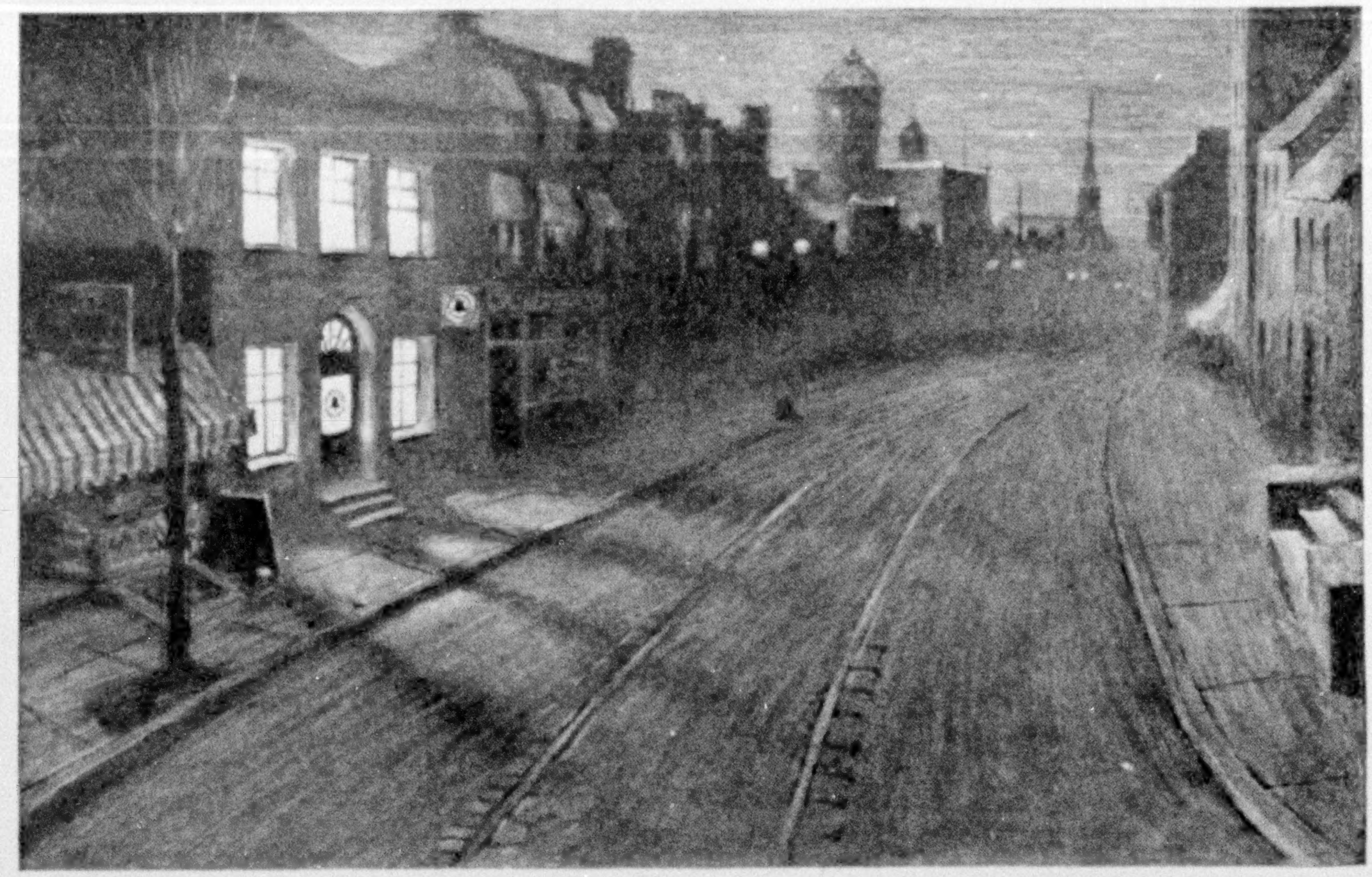
I'm like the car I drive—
I'm energy alive.
And all I need
In dash and speed
From Campbell's I derive!

Luncheon Dinner Supper

21 kinds
12 cents a can

Campbell's SOUPS

LOOK FOR THE RED-AND-WHITE LABEL



In the Dead of Night

In the dead of night a fire breaks out—the alarm must be given. A child is taken sick—the doctor must be called. A thief enters the home—the police must be located.

In the dead of night the American turns to his telephone, confident he will find it ready for the emergency. He knows that telephone exchanges are open always, the operators at their switchboards, the wires ready to vibrate with his words. He has only to lift the receiver from its hook to hear that calm, prompt "Number, please." The constant availability of his telephone gives him security, and makes his life more effective in wider horizons.

Twenty-four-hour service, which is the standard set by the Bell System, is the exception in the service of Continental Europe. An emergency may occur at any time. Continuous and reliable service has become a part of the social and economic fibre of American life.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

XUM

A glimpse of Chicago

Photo by Fairchild Aerial Camera Corp.

Broad Views *for* Bond Buyers

The great city with its expanding wealth of industry, commerce and homes represents the taxing power which protects the purchaser of Municipal Bonds.

A thorough study of a city's financial standing always precedes the purchase of its bonds by The National City Company. Similar painstaking study and care mark the selection of *all* bonds, of whatever kind, offered to investors by this national organization.

We invite you to make yourself known to us so that we can learn your investment requirements and be ready to advise you quickly and intelligently when a new issue desirable for you to own is offered.

The National City Company

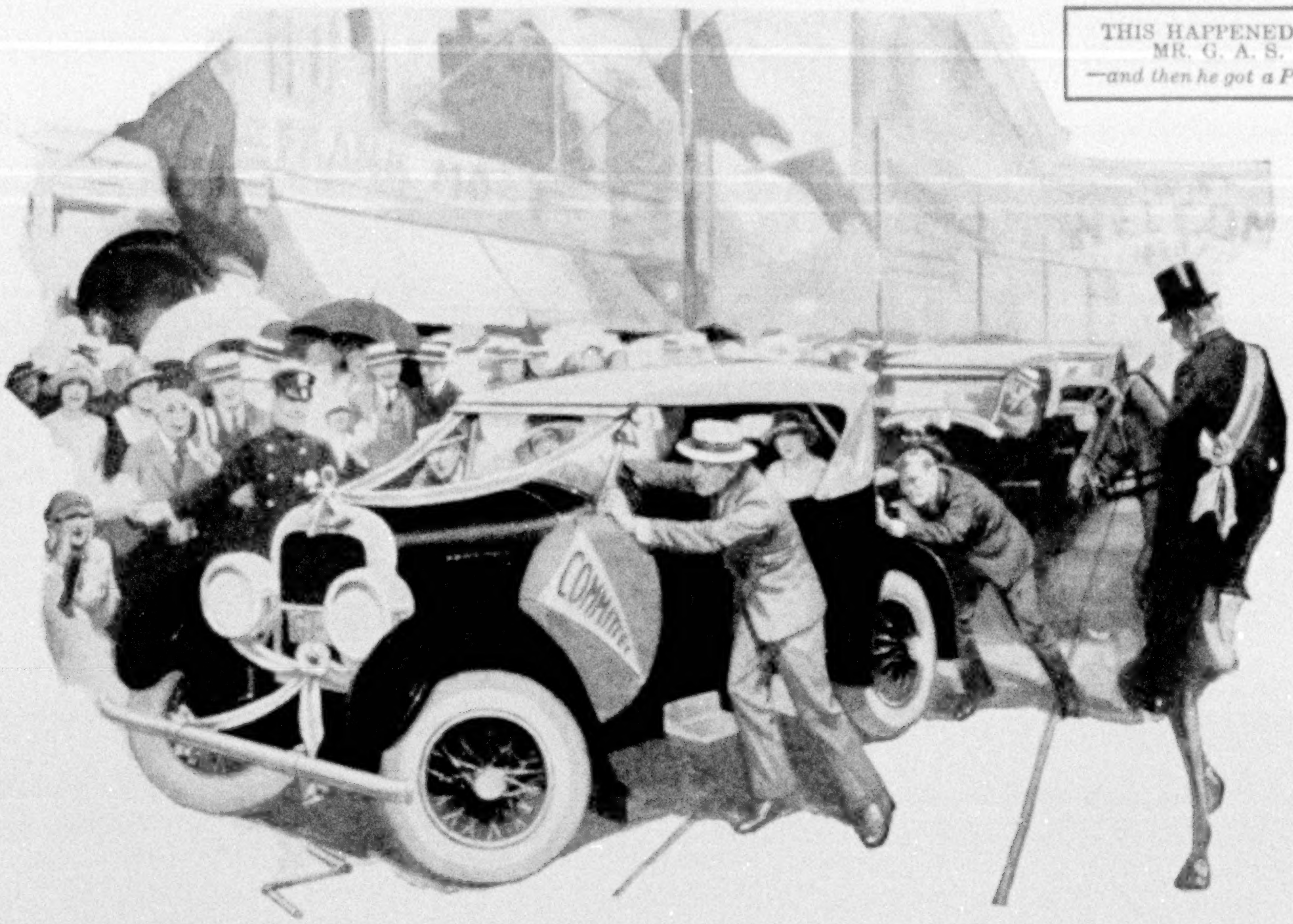
National City Bank Building, New York

You will find offices in more than 50 leading cities in the United States, Canada and abroad

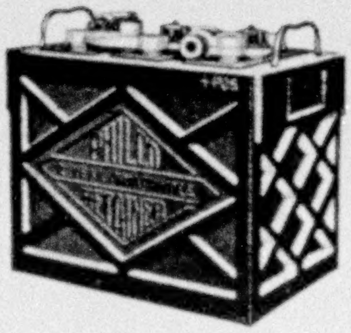
BONDS — SHORT TERM NOTES — ACCEPTANCES

XUM

THIS HAPPENED TO
MR. G. A. S.
—and then he got a Philco!



"Next day I got ~~my~~ Philco!"



LOWEST PRICE IN HISTORY

In spite of the general increase in battery prices, we are able to reduce *still* further the price of the famous

PHILCO RETAINER BATTERY

Over-size Over-powered
Diamond Grid Plates
Guaranteed 2 years

Batteries made by Philco range in exchange price from $15.95 up, depending on type and geographical location—every battery full-size or over-size.

"With my car near the head of the parade—the whole population as spectators—we started down the main avenue. Suddenly my car stopped dead. I pushed on the starter but nothing budged.

"Imagine my humiliation in getting out to crank! The parade, of course, was held up. * * * With the help of two friends—amid the jeers and laughter of the crowd—we finally pushed the car out of the way. The next day I got *my* Philco," writes Mr. G. A. S., of Great Falls, Montana.

The tremendous surplus power, capacity and strength of the Philco Battery are your "margin of safety"—an exclusive built-in reserve that safeguards you against the humiliations and perils of battery failure.

Equally important—the Philco Diamond-Grid Battery with Philco Retainers, *guaranteed for two years,* is the longest-life, lowest-cost-per-month-of-service battery built. Look in your phone book for "Philco Battery Sales and Service," or write us.

Philadelphia Storage Battery Company
Philadelphia

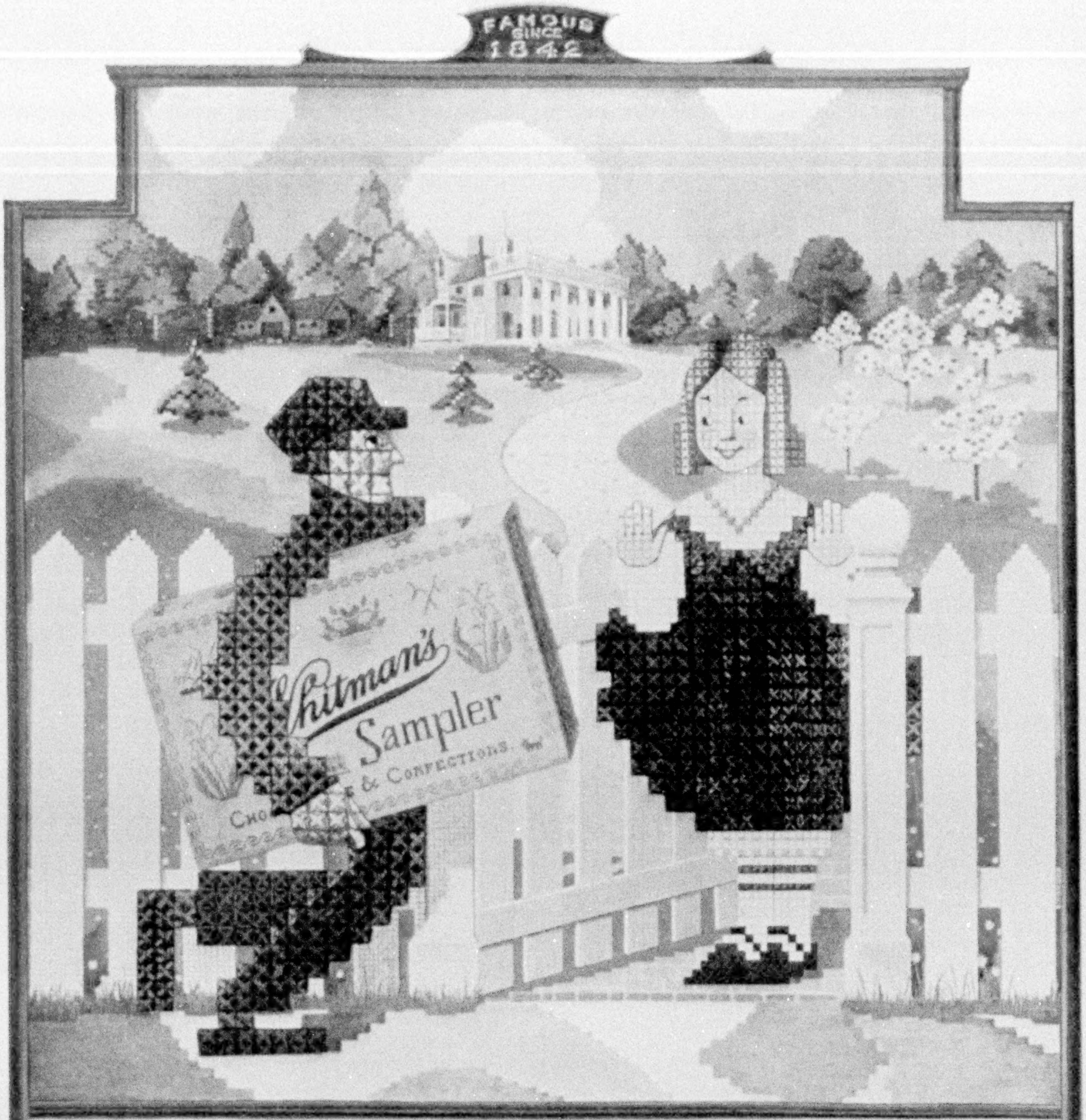
PHILCO DIAMOND GRID **BATTERIES**

REG. U.S. PAT. OFF.

FOR RADIO OWNERS. You can now buy a genuine rechargeable Philco Radio Battery for UV199, WD-11 and WD-12 tubes, including a Philco Charger, for $15.00 or less.

or

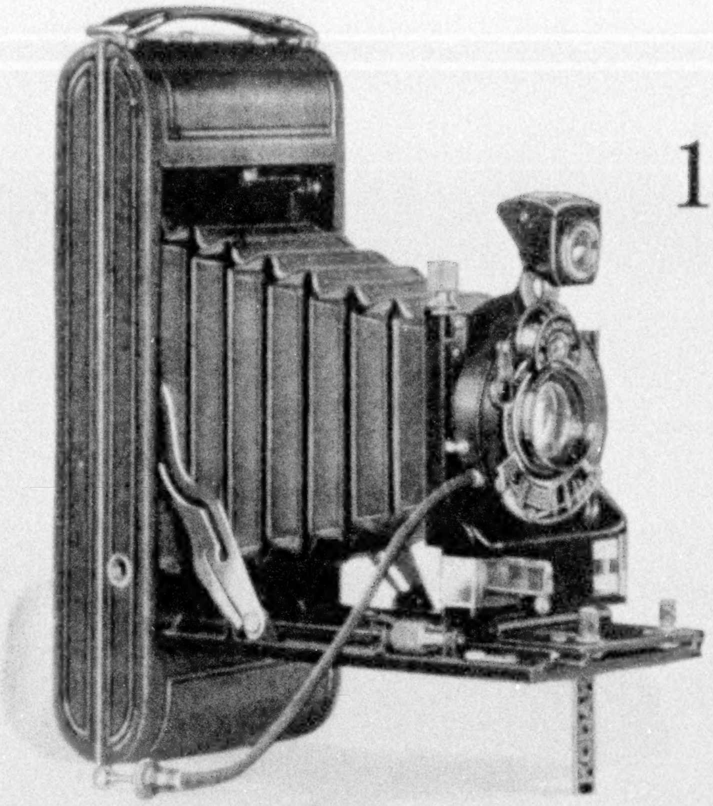
A Philco Battery that will satisfactorily operate up to six UV201A or equivalent tubes, including a Philco Double Charger, approximately $26.



Whitman's Sampler!

SENT WITH satisfaction and greeted with gratitude. The box of chocolates with individuality, charm, prestige. That happy assortment of Whitman's which goes into millions of homes for every-day use. Bought also as a gift, it is always appropriate for anniversaries, for a hostess, for any occasion when the giving of candy is a happy thought. The SAMPLER is sold in all those selected stores, one in nearly every neighborhood, that are agents for the sale of Whitman's.

STEPHEN F. WHITMAN & SON, Inc., Philadelphia, U. S. A.
Sole makers of Whitman's Instantaneous Chocolate, Cocoa and Marshmallow Whip.



1A Autographic Kodak *Special*

Picture, 2½ x 4¼ inches
(Perhaps the most popular size in photography)

Take *this* Kodak with you

There's the Kodak Anastigmat lens *f.6.3*, with speed that often saves the picture, and definition that produces sharp, clean-cut negatives. There's the Kodamatic shutter with its seven-speed, true-speed automatic timing, starting at 1/200 of a second for fast action pictures and including slow snap-shots.

Equipment includes as well the automatic exposure guide that shows at a glance the shutter speed you want with the light you have, the Kodak Range Finder that finds the focus, and the rising front to aid in composition.

Any *Special* Kodak is just as good a hand camera as it is possible to make.

The 1A *Special*, from its convenient size, particularly appeals to the traveler or tourist, and gives him pictures he will treasure.

Price, $60 at your dealer's

Eastman Kodak Company
Rochester, N. Y., *The Kodak City*

The KODAK ANASTIGMATS
f.7.7, *f.6.3* and *f.4.5*

MAXWELL

The Good MAXWELL

In less than six months, the Club Sedan has become the largest selling model of the good Maxwell.

It is easy to understand why such huge volume should have been reached in so short a time.

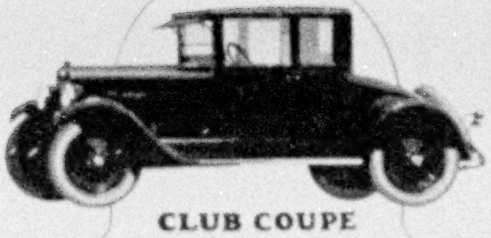
The public saw at once that the Club Sedan is an intensely practical car; it found here not only a new expression, but a distinct broadening, of motor car utility.

The Club Sedan was—and still is—a new type of car; new in its seating arrangement, its seating space and tonneau roominess; new in providing a higher degree of accessibility; new in generosity of two-door design which gives four-door convenience; new in the number of uses to which it is perfectly adapted.

With such superiorities and advantages, and many of them exclusive to the Club Sedan, it is small wonder that the public is buying so eagerly.

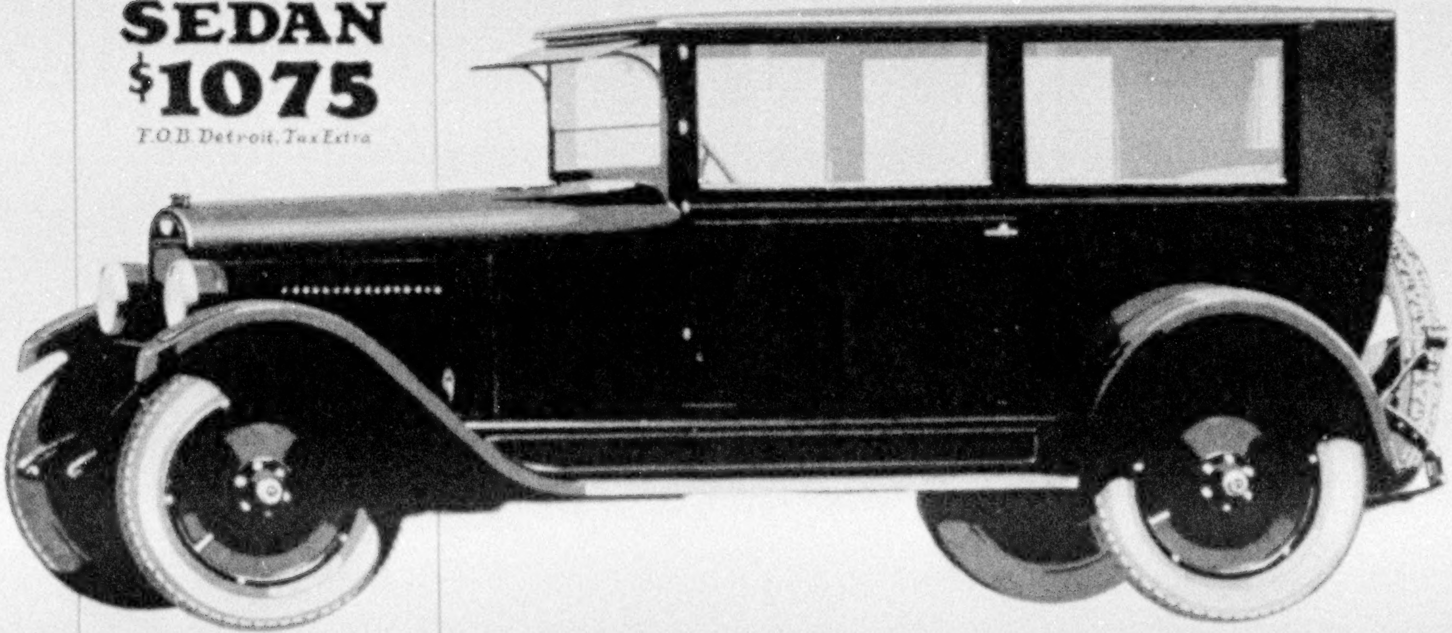
As we have said in the past, Maxwell once more has demonstrated its ability to provide the car which the public wants.

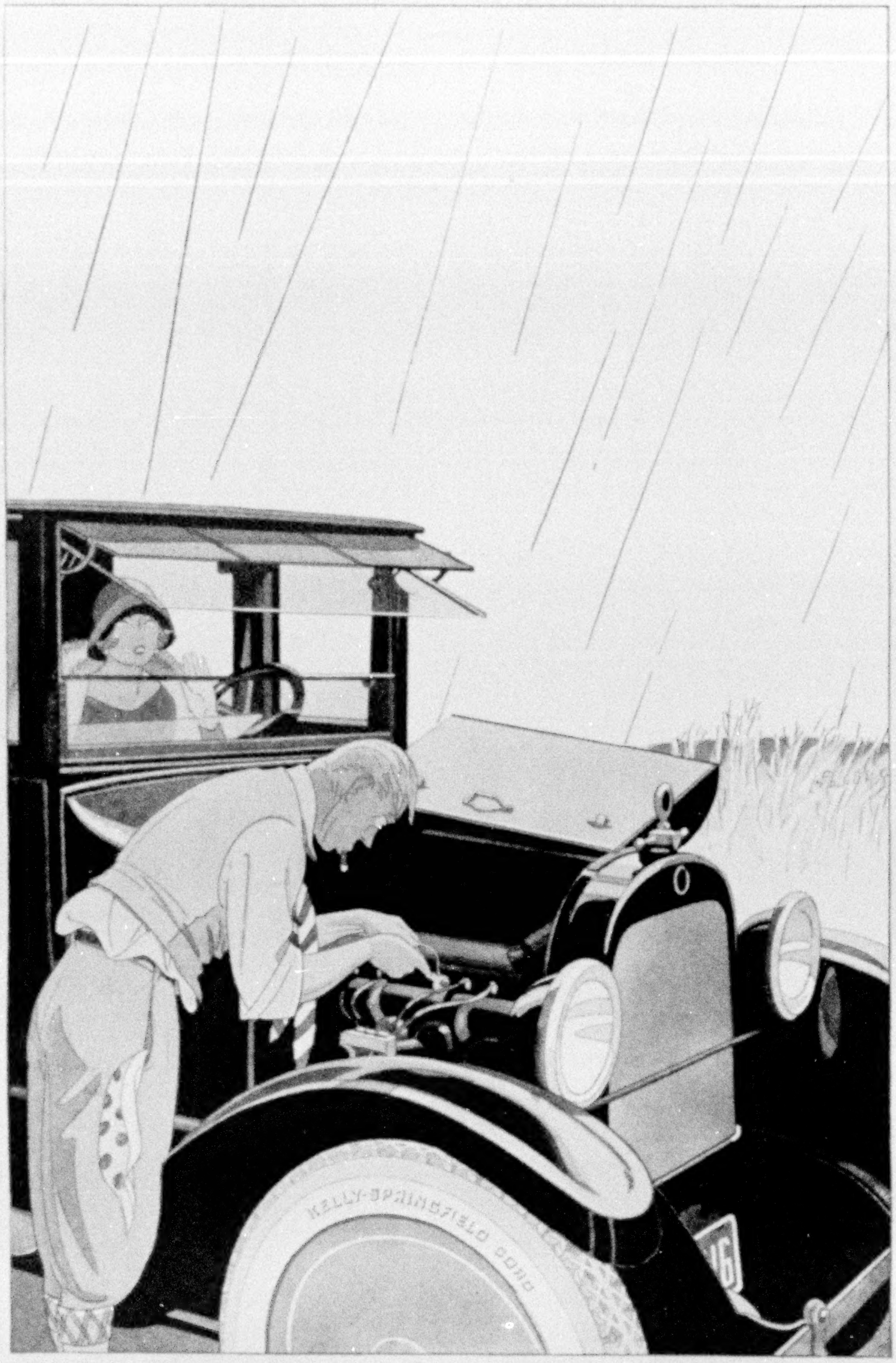
MAXWELL MOTOR SALES CORP., DETROIT, MICHIGAN
MAXWELL-CHALMERS MOTOR CO. OF CAN., LTD., WINDSOR, ONT.



CLUB COUPE
$995
F.O.B. Detroit, Tax Extra

The
CLUB SEDAN
$1075
F.O.B. Detroit, Tax Extra



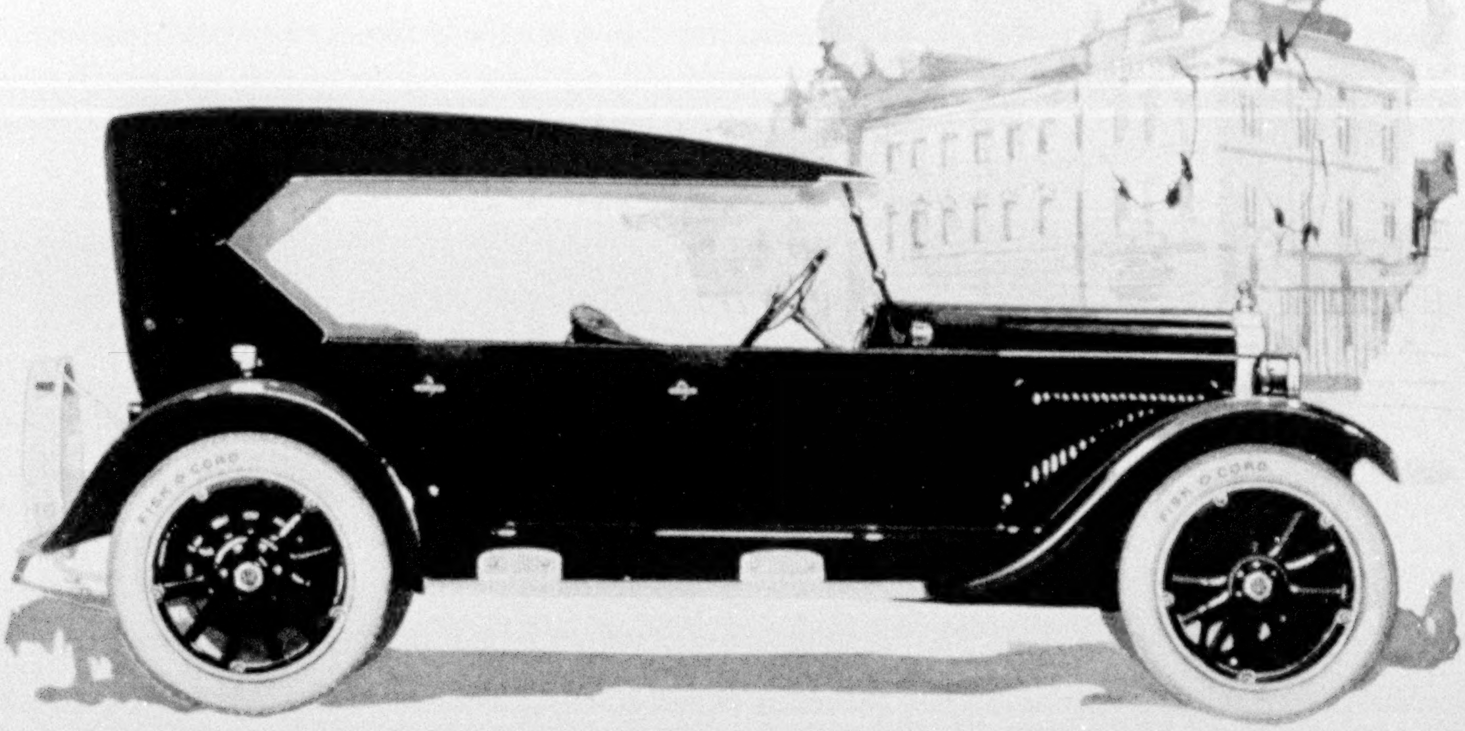


"Oh, Jerry, why did you buy those cheap spark plugs when you were so particular to get Kelly-Springfield tires?"

EVEN the fact that Kelly-Springfield tires give long economical mileage is secondary to the priceless peace of mind they assure every occupant of the car. No skidding—no failing in a crisis—no exasperating development of weakness—no anxiety. Kellys have enabled hundreds of thousands of car owners to get the maximum enjoyment from their cars.

It costs no more to buy a Kelly

WILLYS-KNIGHT



You Want to Keep It!

When you own a sweet-running Willys-Knight you own a car you want to keep. As the days and weeks and months slip by, you are amazed and delighted to find yourself in possession of an engine that actually *improves* with use.

Any number of Willys-Knight owners have reported 50,000 miles and more without any tinkering with the engine. No valves to grind. No carbon cleaning. Carbon only increases compression. This engine is quieter, smoother, more powerful at 15,000 miles than when new.

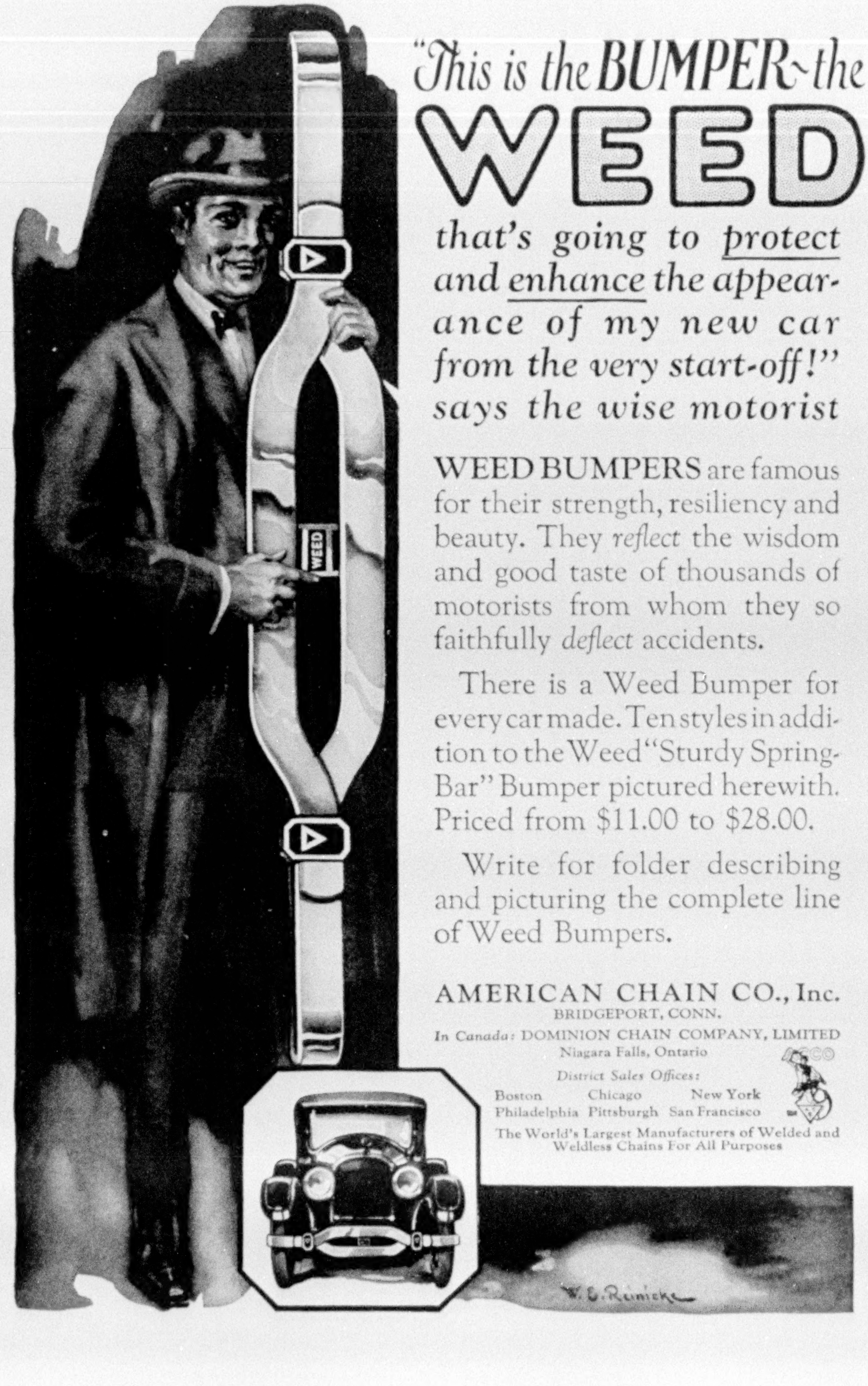
All these benefits are due to the very simplicity of the Willys-Knight sleeve-valve principle. For simplicity means longer life—fewer parts to need repairs.

Money's worth means mileage. And mileage means a Willys-Knight. Mileage, plus absolute freedom from clicking valves and hammering cams. Freedom, plus the pride and satisfaction of owning a car you want to keep, season after season. *No Willys-Knight engine has ever been known to wear out.*

Willys-Knight Models: 2-pass. Roadster $1175; 5-pass. Touring $1195; 7-pass. Touring $1325; 5-pass. Coupe-Sedan (Standard $1450, De Luxe $1550); 5-pass. Sedan $1695 (De Luxe $1895); 7-pass. Sedan $1995; all prices f. o. b. Toledo. We reserve the right to change prices and specifications without notice.

Willys-Overland, Inc., Toledo, O. Willys-Overland Sales Co. Ltd., Toronto, Can.

THE DAY OF THE KNIGHT IS HERE



"This is the BUMPER~the WEED

that's going to protect and enhance the appearance of my new car from the very start-off!" says the wise motorist

WEED BUMPERS are famous for their strength, resiliency and beauty. They *reflect* the wisdom and good taste of thousands of motorists from whom they so faithfully *deflect* accidents.

There is a Weed Bumper for every car made. Ten styles in addition to the Weed "Sturdy Spring-Bar" Bumper pictured herewith. Priced from $11.00 to $28.00.

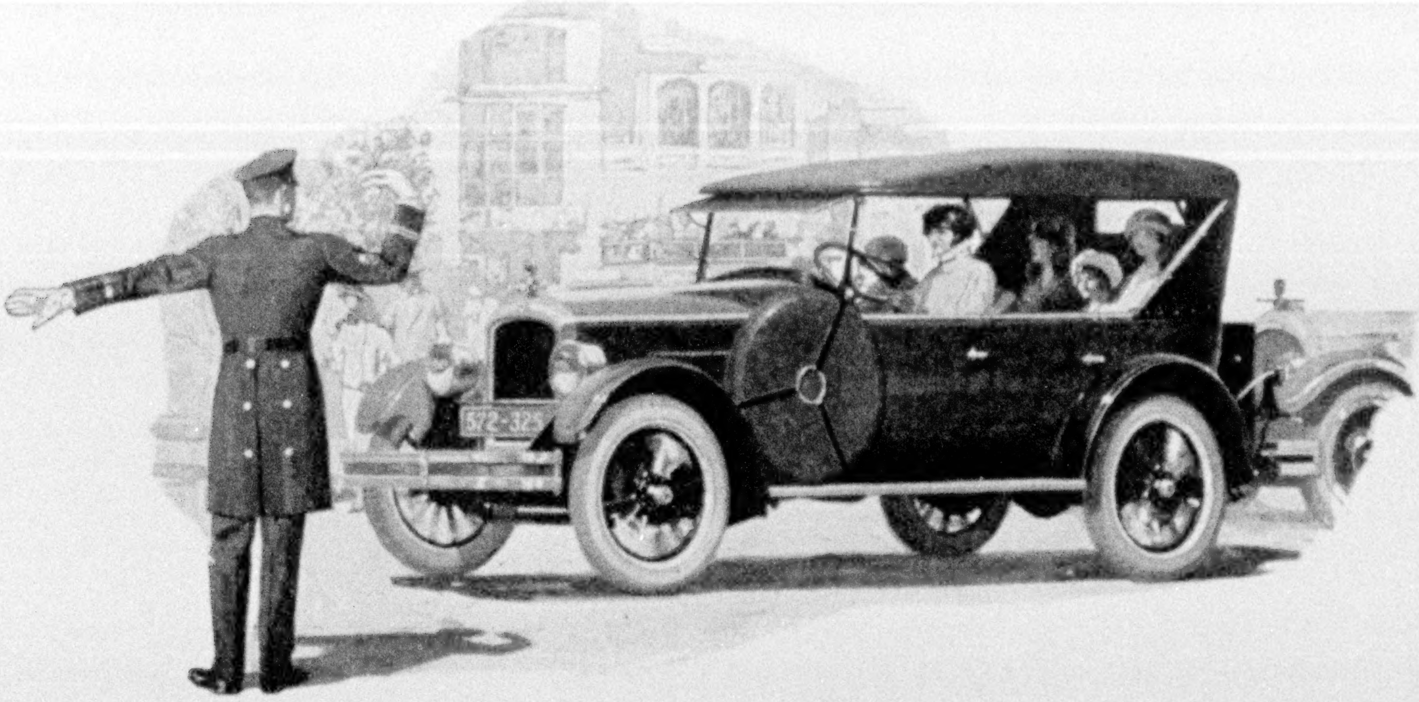
Write for folder describing and picturing the complete line of Weed Bumpers.

AMERICAN CHAIN CO., Inc.
BRIDGEPORT, CONN.
In Canada: DOMINION CHAIN COMPANY, LIMITED
Niagara Falls, Ontario

District Sales Offices:
Boston Chicago New York
Philadelphia Pittsburgh San Francisco

The World's Largest Manufacturers of Welded and Weldless Chains For All Purposes

IN ALL THE WORLD NO CAR LIKE THIS



The Complete De Luxe Beauty

THERE'S style in every line of this Jewett. Japanese blue finish, matched by hand-crushed Spanish leather, is set off smartly by the flash of full nickeled trimmings and equipment. Its thousands of owners are proud of its appearance. And there's nothing extra to buy for this De Luxe beauty. Its equipment is beautifully complete.

In this Jewett modest cost buys thrilling fifty horsepower performance. Takes hard hills in high, easily, that most cars "rush" to make. Jewett even picks up on hills! You can drive Jewett from 2 to 60 miles an hour, or more, in high; accelerate from 5 to 25 miles an hour in 7 seconds, in high!

Jewett's cylinders are 3¼x5 inches, giving 249 cubic inches piston displacement—far more power than "light" sixes. Jewett's motor stays good because it is high-pressure oiled like the big Paige and other top quality cars.

Women marvel at the easy handling of this powerful, nimble car. Gear-shifting is rarely necessary—and then how simple! Clutch pressure is gentle—depress it with your hand to prove this. Jewett steers with finger-touch guidance, due to ball-bearing steering spindles.

Convenient chassis size permits Jewett to park in but 16½ feet at the curb; turn around easily in a 42-foot street; enter or leave your garage on but a 14-foot driveway. Yet Jewett's bodies are as roomy inside as larger, cumbersome cars!

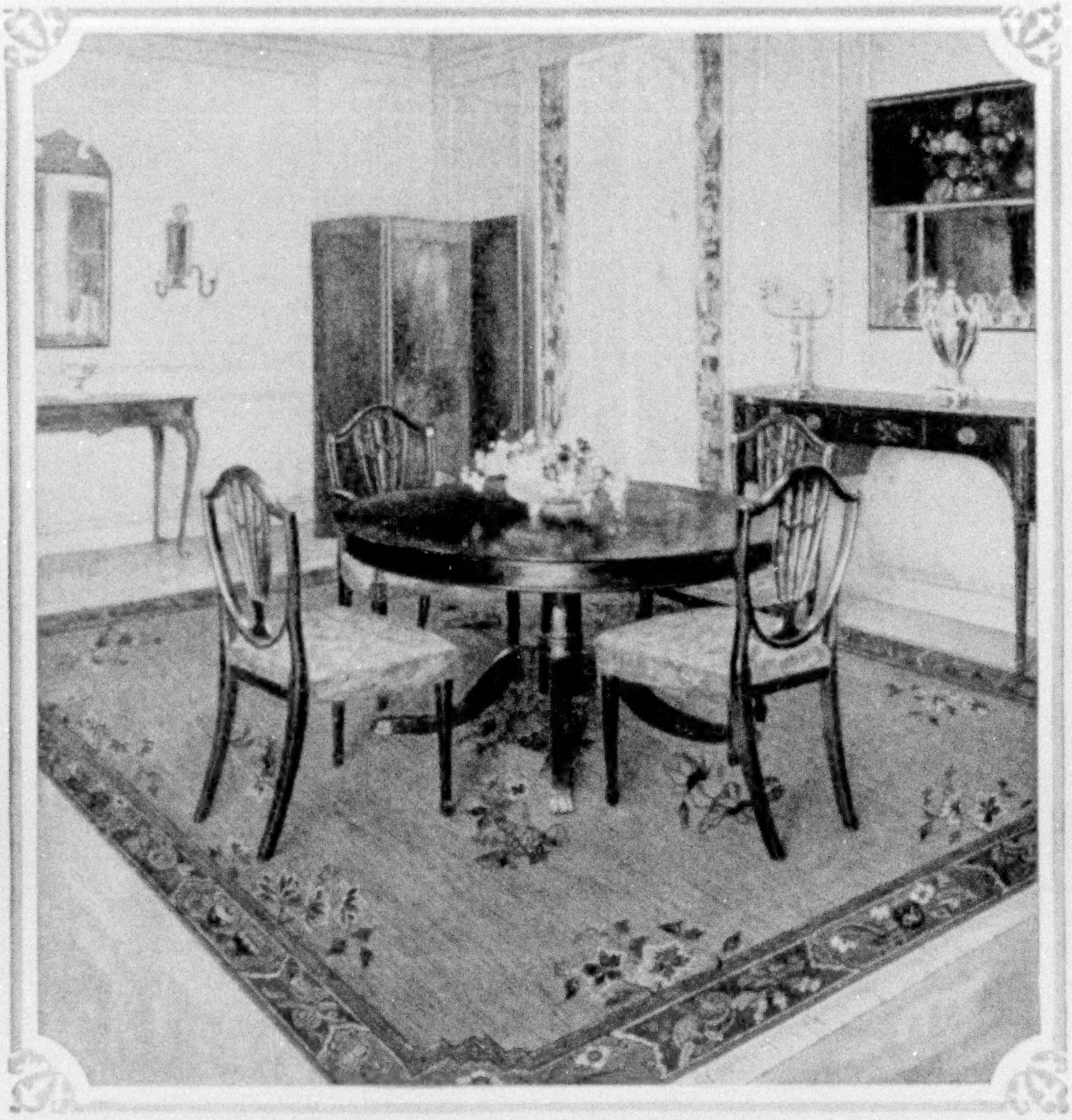
In all the world no car like this! For Jewett combines mechanical superiorities and advantages not found in any other car. Let the near-by Jewett dealer show you—better still, drive the car yourself. (608-A)

Touring	$1065	Sedan	$1495	De Luxe Touring .	$1220
Brougham	1325	Coupe	1250	De Luxe Sedan . .	1695

Prices at Detroit. Tax Extra.

JEWETT SIX

PAIGE BUILT



KARNAK RUGS give to the home an atmosphere which suggests pride of possession and the utmost care in the selection of its furnishings.

They embody every desirable rug attribute—beauty of pattern, harmony of coloring, and long wearing life.

Karnak designs are faithful reproductions of the most beautiful Orientals of antiquity.

See them at the better stores

Look for the woven Karnak name and the black and gold silk guarantee label on the back of the rug.

Write for booklet containing suggestions for beautifying the home. Illustrated with colorphotographs of interiors and full color reproductions of Karnak Rugs.

MOHAWK CARPET MILLS, INC.
Manufacturers of Rosslyn, Glendale and
highest quality Chenille carpets and rugs.

W. & J. SLOANE
Selling Agents
581 FIFTH AVENUE, NEW YORK CITY

KARNAK
RUGS
The aristocrat
of American Wiltons

Whiter Teeth

Show you the people who combat the film

COUNTLESS people whom you meet today show glistening teeth. Far whiter than yours, perhaps. Let this test show you how folks get them.

By fighting film

Teeth are clouded by a film—that viscous film you feel. It clings tenaciously. No ordinary tooth paste can effectively combat it.

Soon that film discolors, then forms dingy coats. That is why teeth lose luster.

Film also holds food substance which ferments and forms acid. It holds the acid in contact with the teeth to cause decay. Germs breed by millions in it. They, with tartar, are the chief cause of pyorrhea.

Very few who brush teeth in old ways escape these film-caused troubles.

Dental science has now found two effective film combatants. One disintegrates the film, one removes it without harmful scouring.

PROTECT THE ENAMEL
Pepsodent disintegrates the film, then removes it with an agent far softer than enamel. Never use a film combatant which contains harsh grit.

These methods have been proved by many careful tests. A new-type tooth paste has been created to apply them daily. The name is Pepsodent.

Pepsodent is now used by millions the world over, largely by dental advice.

10 days will tell

Every use of Pepsodent also multiplies the tooth-protecting agents in saliva. These combined effects are bringing a new dental era to people all about you.

Send the coupon for a 10-Day Tube. Note how clean the teeth feel after using. Mark the absence of the viscous film. See how teeth become whiter as the film-coats disappear.

You will gain a new conception of what clean teeth mean. Cut out coupon now.

Pepsodent PAT. OFF. REG. U.S.

The New-Day Dentifrice

Now advised by leading dentists the world over

10-DAY TUBE FREE 1418

THE PEPSODENT COMPANY
Dept. 845, 1104 S. Wabash Ave., Chicago, Ill.
Mail 10-Day Tube of Pepsodent to

____

____

Only one tube to a family.

XUM

KIMBALL

"The Instrument of Yesterday, Today and Tomorrow"

MYRNA SHARLOW, American Soprano, whose roles with the Chicago Civic Opera Company are highly praised for the rich beauty of her singing, is a competent judge of musical worth. In outspoken terms she declares: "The Kimball is beautiful and dependable, and a piano to make the opera singer rejoice."

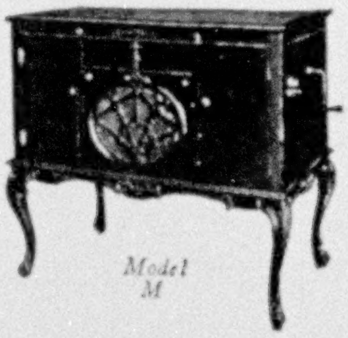
MARCELLA SEMBRICH, the celebrated Polish prima donna, when at the height of her operatic career, said of the Kimball: "Ranks with the best instruments before the world."

Thus the years voice the praise of those who are eminently fitted to appreciate the merit of the Kimball—the piano of imperishable fame.

Style 29

KIMBALL

Grand Pianos *Music Rolls*
Upright Pianos *Phonographs*
Player Pianos *Pipe Organs*
Reproducing Pianos



Model M

W. W. KIMBALL CO., Dept. KNG
306 South Wabash Avenue, Chicago, Ill.

Gentlemen: Please mail catalog and information on instrument marked X:
☐KIMBALL Reproducing Pianos
☐KIMBALL Grand Pianos
☐KIMBALL Phonographs
☐KIMBALL Upright Pianos
☐KIMBALL Player Pianos

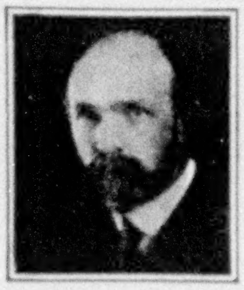
Name...

Address...

Descriptive catalogs, also nearest dealer's address sent to you on request

W. W.
KIMBALL CO.
(Established 1857)
Factory and Executive Offices
CHICAGO, U. S. A.

Does your English Help or Hurt you?



SHERWIN CODY

Amazing as it may seem, actual tests prove that the average person is only 61 per cent efficient in the essential points of English. Most persons realize that they may be making mistakes, but do not know what they are or how often they are made. Sherwin Cody, America's foremost teacher of practical English, has at last solved the problem of how you can test your knowledge of English and see just where you stand—you can instantly discover your mistakes and correct them forever.

Sherwin Cody's Great Invention

In his new method, Mr. Cody has made it remarkably easy for you to learn correct English rapidly. He has discarded all the old methods which made English so hard to learn. No time is wasted. All your efforts are concentrated on acquiring a perfect command of English—eliminating your mistakes and substituting for them the correct way. Only 15 minutes a day, in your spare time, is all you need to learn English this wonderful, new way

FREE! Get this test *and* book—FREE

Mr. Cody has prepared a short, interesting, 15-minute test which tells you, privately, just where you stand in your knowledge of good English. If you are better than the average, it will give you added confidence in your ability; if you are deficient you surely want to know it. Write today for this test—it is free. We will also send you our new free book, "How to Speak and Write Masterly English," which explains in greater detail how Mr. Cody's great invention gives you a masterly command of English in only 15 minutes a day. Write TODAY.

Sherwin Cody School of English
385 SEARLE BUILDING ROCHESTER, N. Y.

ESCORTED TOURS TO "Europe 1924"

Under the Experienced Management of the
American Express Travel Dept.

Planned and conducted by experts, these tours offer delightful Summer Travels abroad. Interesting itineraries, varied as to time, places and costs.

STANDARD TOURS—high grade—unusually appealing itineraries—66 days—$1495. Sailings every Wednesday and Saturday, May 28th to July 16th. Via the **MEDITERRANEAN**, June-July. SPAIN, the FRENCH RIVIERA and ITALY, sailings in May, June, July. Ask for Booklet "**Europe 1924.**"

6 WEEKS' VACATION TOURS—$610. Sailings every Saturday beginning June 7th. *Special Booklet.*

ANNUAL STUDENTS' TOURS—July 2nd to September 1st. *Special Booklet.*

UNIQUE TOUR TO SCANDINAVIA—July 5th to September 1st. *Special Booklet.*

VARIED TOURS from **LONDON** and **PARIS**. *Special Booklet.*

EUCHARISTIC CONGRESS—Amsterdam in July—with pilgrimages to Rome, Lourdes, Ireland. *Special Booklet.*

INDEPENDENT TOURS—to Europe at any time. All details arranged. *Booklet.*

DOMESTIC TOURS—Conducted or Independent—United States, Canada, West Indies, etc. *Booklet.*

Information on any of the above offerings promptly and fully given. Address

American Express Travel Department
65 Broadway, New York
Always carry American Express Travelers' Cheques.

MAKING MOTION PICTURES WITH A CINÉ-KODAK (THE MOTOR CRANKS THE CAMERA)

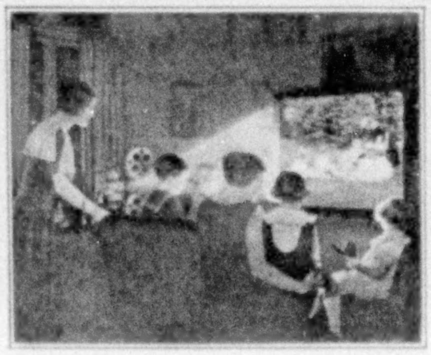
You press the button; we do the rest

CINÉ-KODAK, the new Eastman invention, and its projector, the Kodascope, enable you to show in *motion* on your screen the sort of pictures you turn to first in your album. Train the camera, press the button and the result is a reel of personal motion pictures that for you and yours will be priceless.

And the fascination of personal photoplays isn't all. Through Kodascope Libraries, Inc., professional releases may be rented for projection in your own home.

Price of complete outfit, Ciné-Kodak with either motor drive or tripod and crank, Kodascope, Screen, etc, $335. Cost of operating is less than 1/5 of the operating expense of equipment using standard width film, and your finishing by Eastman experts in Eastman laboratories is paid for when you buy the film. *You press the button; we do the rest.*

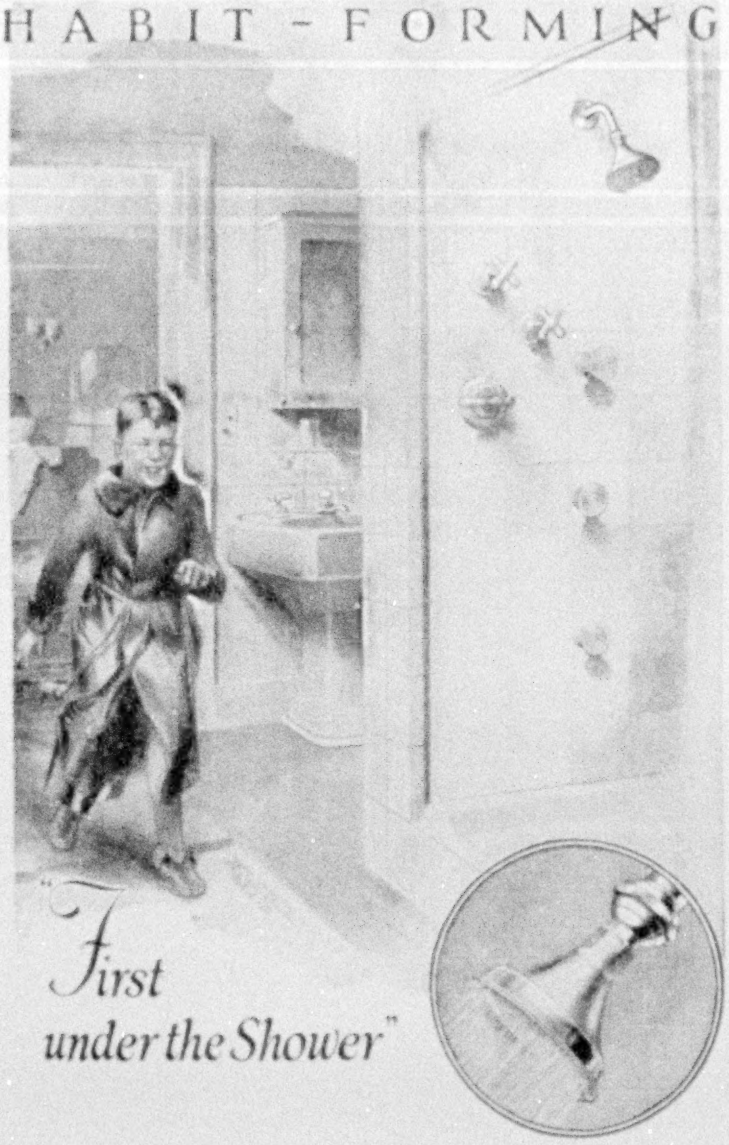
Descriptive booklet at your dealer's or from us



SEEING THE PICTURES WITH THE KODASCOPE

Eastman Kodak Company, Rochester, N.Y., *The Kodak City*

HABIT-FORMING



AND at the breakfast table, he told the folks something like this:

"Dad hasn't anything on me now. I take a shower every morning, too."

"That's fine," comments Dad, "keep it up."

"Surely will; doesn't it make you feel fine? Dad, do you know I never thought I would like a bath so much that I would take one every day?"

And so the good habit of an *every morning shower* is formed.

You'll find, too, that the shower gives *you* a new feeling. You are invigorated and stimulated as well, for a shower is really more than a bath.

Your myriad of pores, massaged by sparkling sprays of clean water, have been made to work—to function freely. And what they have thrown off has been washed away instantly—the water is used only once.

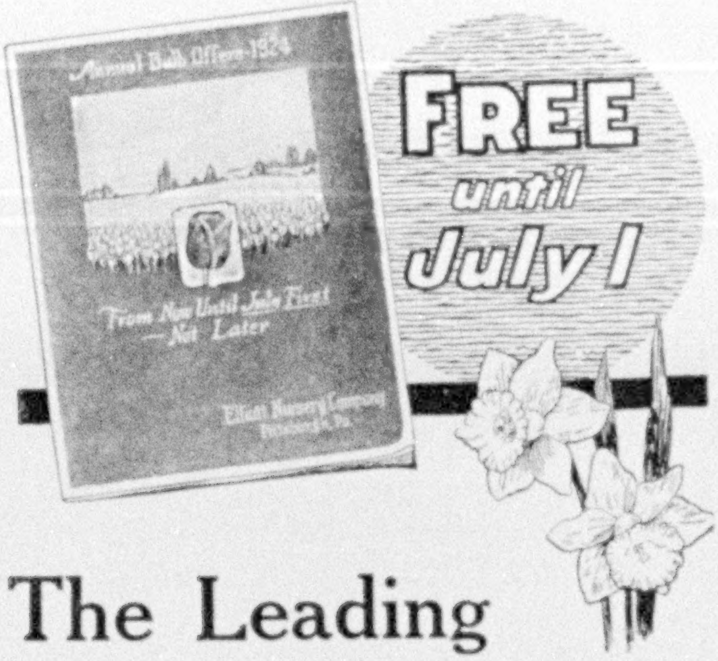
Showers can be installed in any bathroom. There are many types. Your plumber knows them all. He also has a SPEAKMAN Shower catalog and other SPEAKMAN Shower literature.

There is one booklet in particular that you should have. Its title is "Once-Used Water." In writing for it, will you please mention your plumber's name?

SPEAKMAN COMPANY, Wilmington, Del.

SPEAKMAN SHOWERS

THE MODERN BATH ROOM HAS A SHOWER


Annual Bulb Offer—1924
From Now Until July First —Not Later
Elliott Nursery Company Pittsburgh, Pa.
FREE until July 1

The Leading Bulb Book for 1924

Makes bulb-growing easy. Elliott's Import Catalog for 1924 is the most complete and helpful book of its kind ever offered. It tells the best and easiest way of growing Hyacinths, Tulips, Daffodils, Lilies and other bulbs, in the home and outdoors. It describes thousands of the best varieties, many illustrated in their natural colors, *at special import prices.*

America's foremost bulb specialists for over thirty-five years, Elliotts bring to America each season the very cream of Holland's bulb crops. Because they are selected *early* by Elliott representatives right in the fields of famous Holland growers, Elliott bulbs are big, full of life, sure to grow and bear the largest and most beautiful flowers.

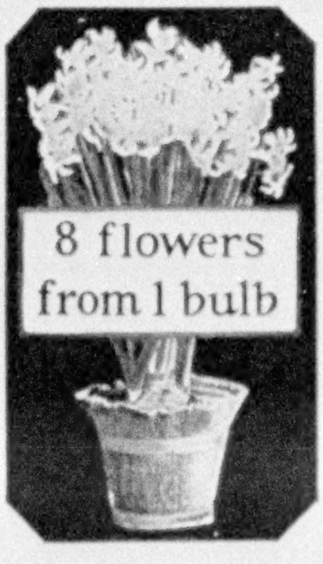
Send for Bulb Book now! The special import prices in Elliott's Bulb Book are good only until July 1. By that time the bulb harvest will be under way and our representatives in Holland must have final orders for selecting Elliott quality bulbs. Late buyers must take a chance on smaller bulbs and higher cost. Make sure of getting the best at the season's lowest prices.

New!

Elliott growers have developed a remarkable new Hyacinth which produces 6 to 10 separate flower trusses on each bulb, instead of only ONE. A few of these bulbs, planted in pots or vases, will make a rare and delightful showing in your home next winter. Easy to grow. Not over 12 bulbs sold to any one customer—supply limited. Order now.

SPECIAL INTRODUCTORY OFFER—Pink, red, white, light blue or dark blue—your choice, 35c each, 3 for $1.00.

Write for Bulb Book today.



ELLIOTT NURSERY CO.

580 MAGEE BLDG. PITTSBURGH, PA.

COLGATE'S

Shaving Stick

"HANDY GRIP" AND REFILL

SHAVING STICK
COLGATE & CO
NEW YORK, U.S.A.

For Comfort, Convenience and Economy

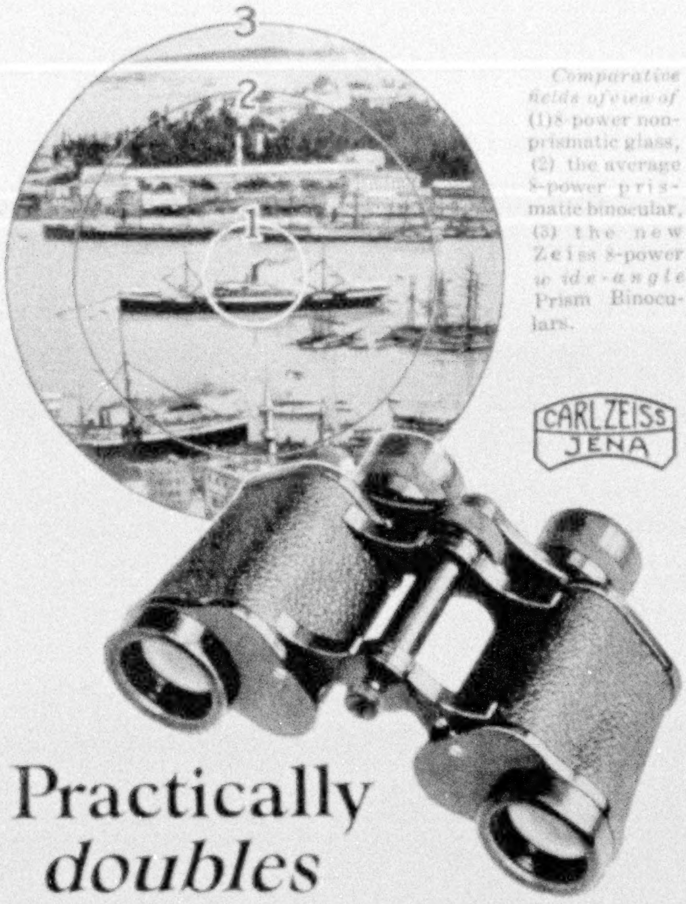
When we say to you that the Shaving Stick has important advantages over shaving preparations in any other form, we can do so without bias, for we manufacture shaving sticks, powder and cream.

In its attractive nickel box, our "Handy Grip" Shaving Stick is most convenient for traveling. It will not crush when packed, and it makes a wonderful lather for *easy* shaving.

It is not uncommon for a Colgate Shaving Stick to last more than a year in daily use.

The famous "Handy Grip", with a trial-size shaving stick in nickel box, sent for 10c. When the trial stick is gone, buy Colgate "Refills" for the price of the soap alone, 25c.

COLGATE & CO. ⸱ *Established 1806* ⸱ NEW YORK



Comparative fields of view of (1) 8-power non-prismatic glass, (2) the average 8-power prismatic binocular, (3) the new Zeiss 8-power *wide-angle* Prism Binoculars.

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The field of view seen through the new Zeiss *wide-angle* Prism Binoculars covers almost twice the area of the view seen through the average prism binoculars of equal magnification. It covers over 20 times the area seen with a non-prismatic glass.

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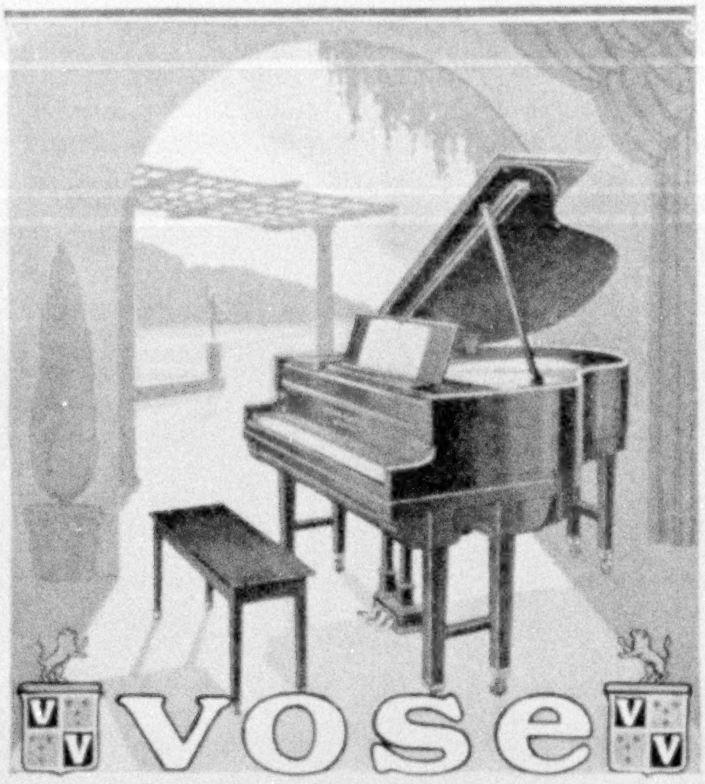

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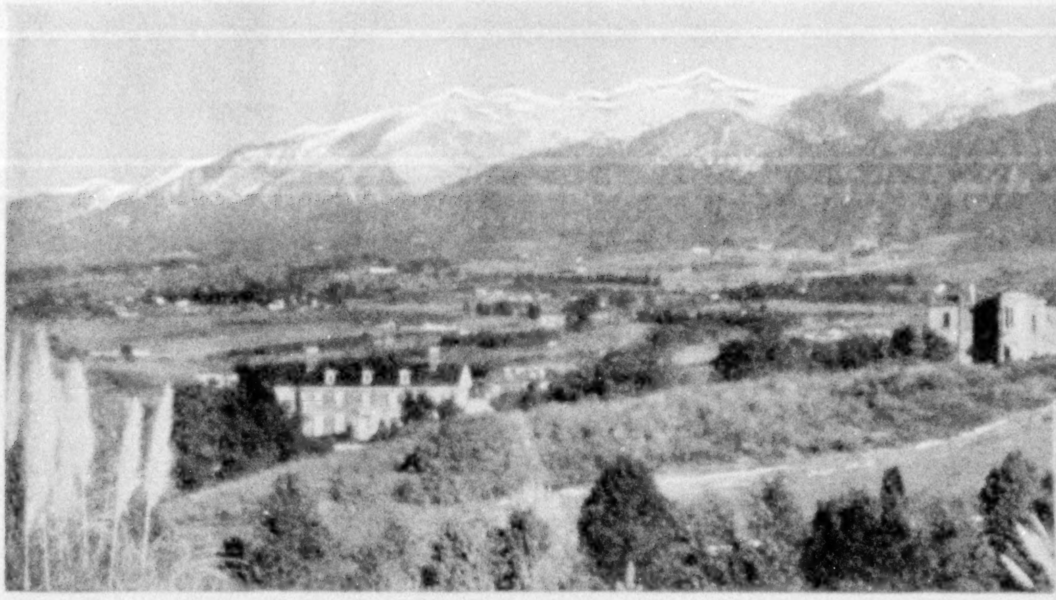

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IT'S amazing how many who have been here return year after year. That's especially true of summer vacationists. For here in a small section of the United States they find the wonders and the beauties and the fun of three continents combined.

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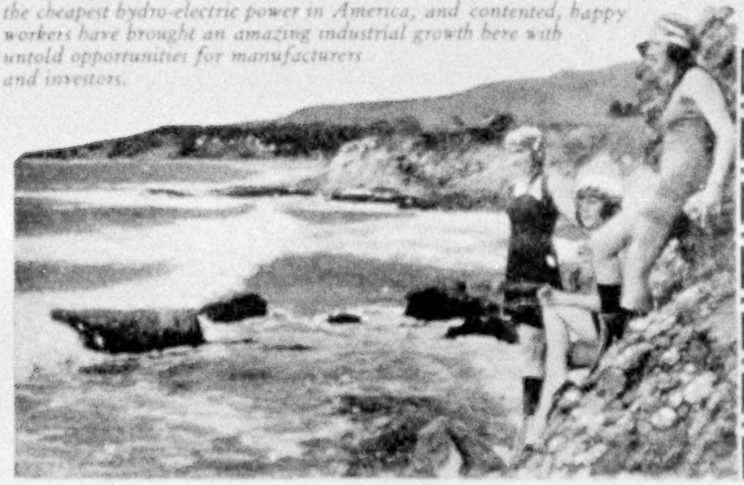

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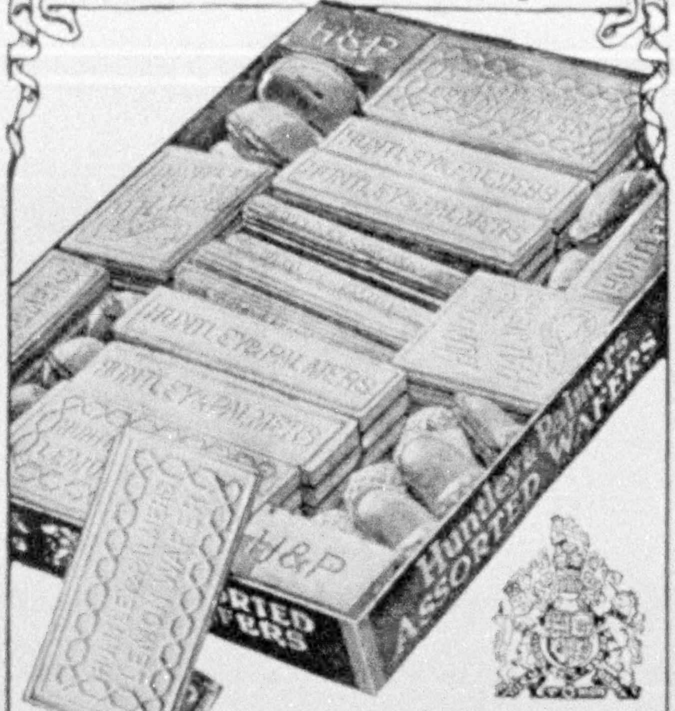

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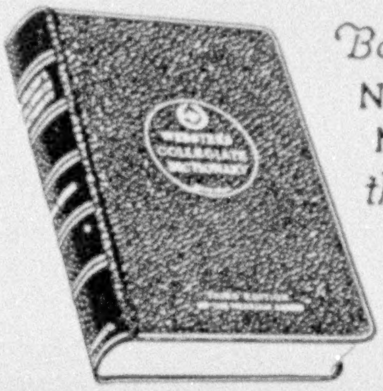

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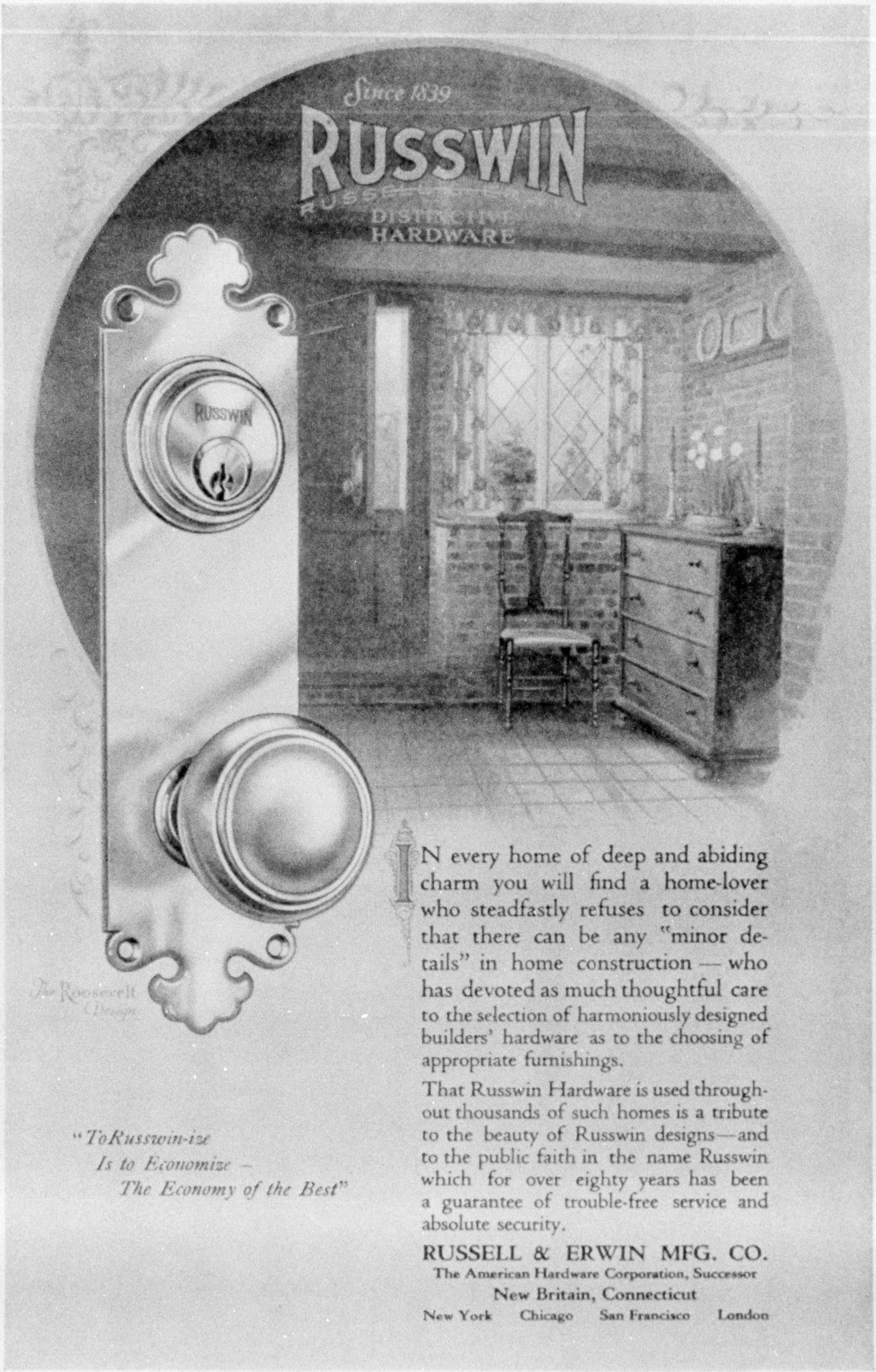
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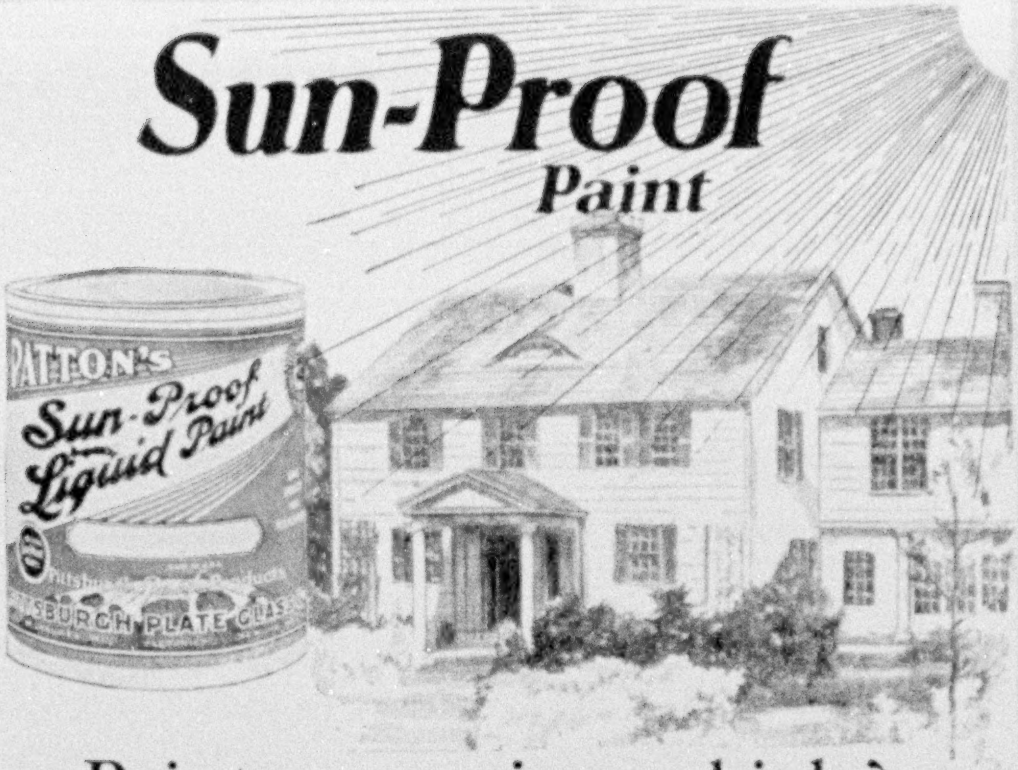
Paint

Sun-Proof
Paint



Paint or repair—which?

IT MUST be one or the other. The house that is neglected quickly succumbs to the attack of the elements. The unprotected surface is eaten into by rain and moisture. Decay and rot—often irreparable destruction—is the result.

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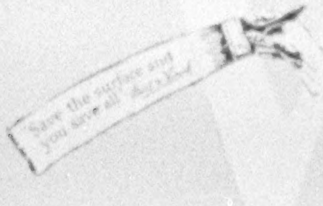
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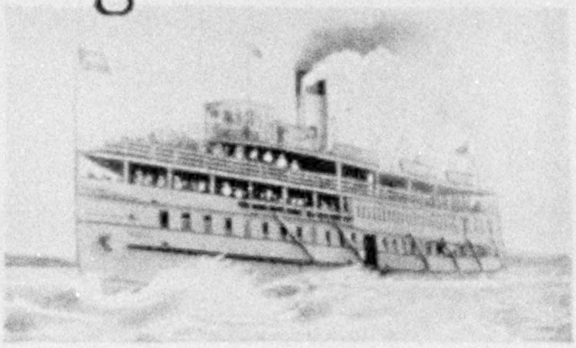

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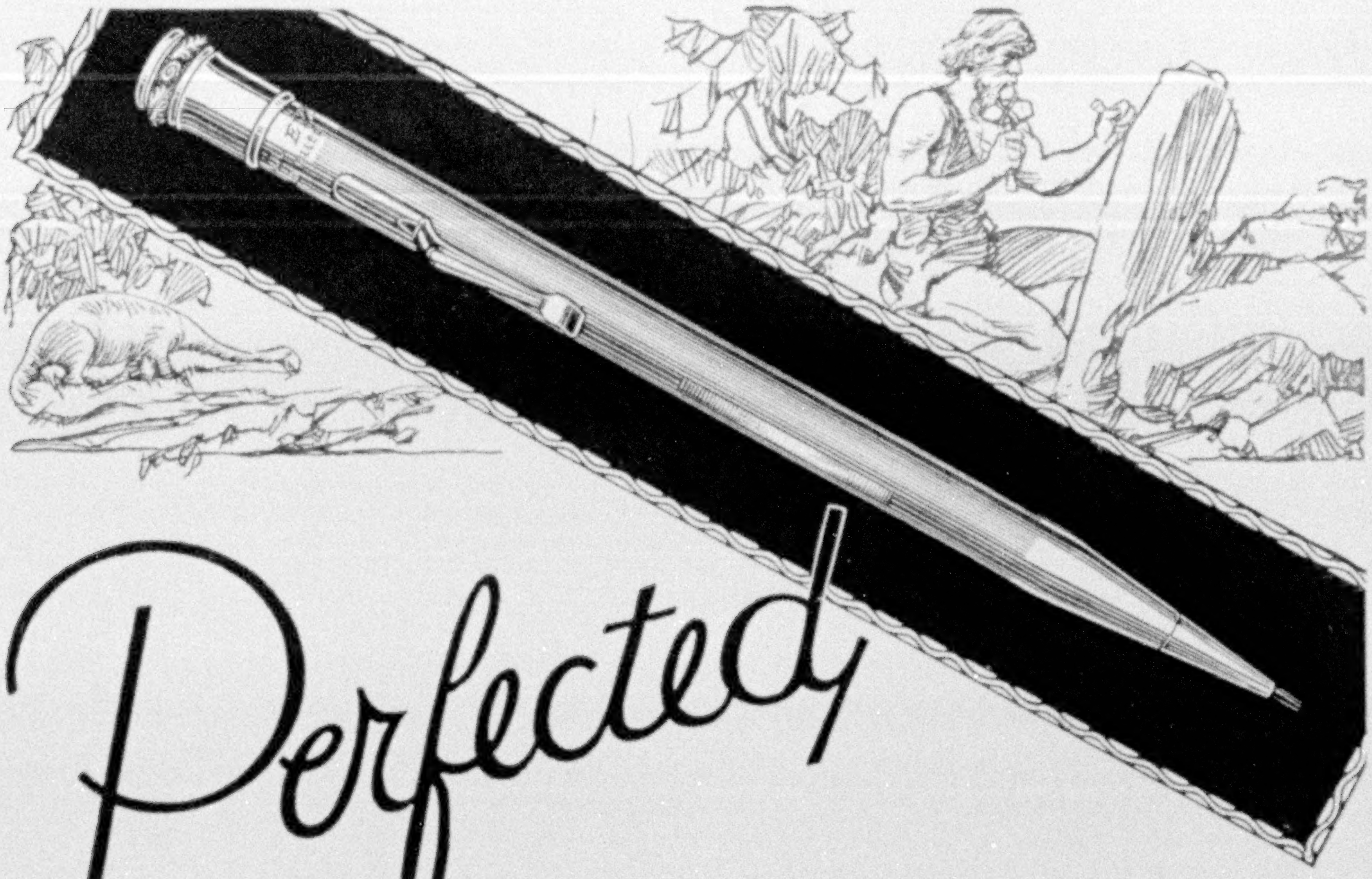

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And now comes the new perfected Eversharp.

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Eng. Dept. A-10

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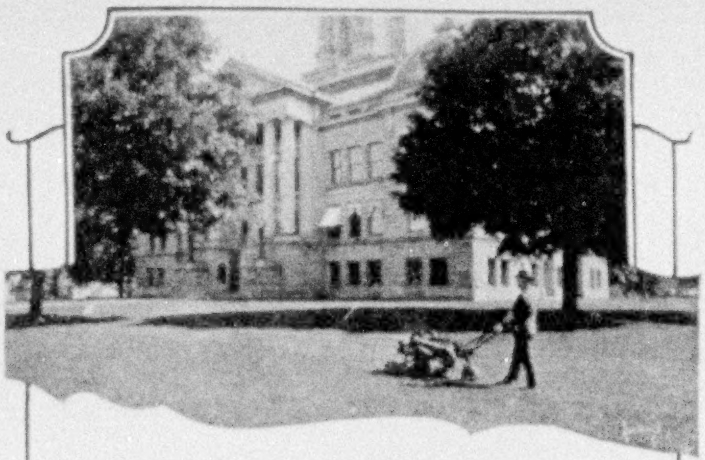

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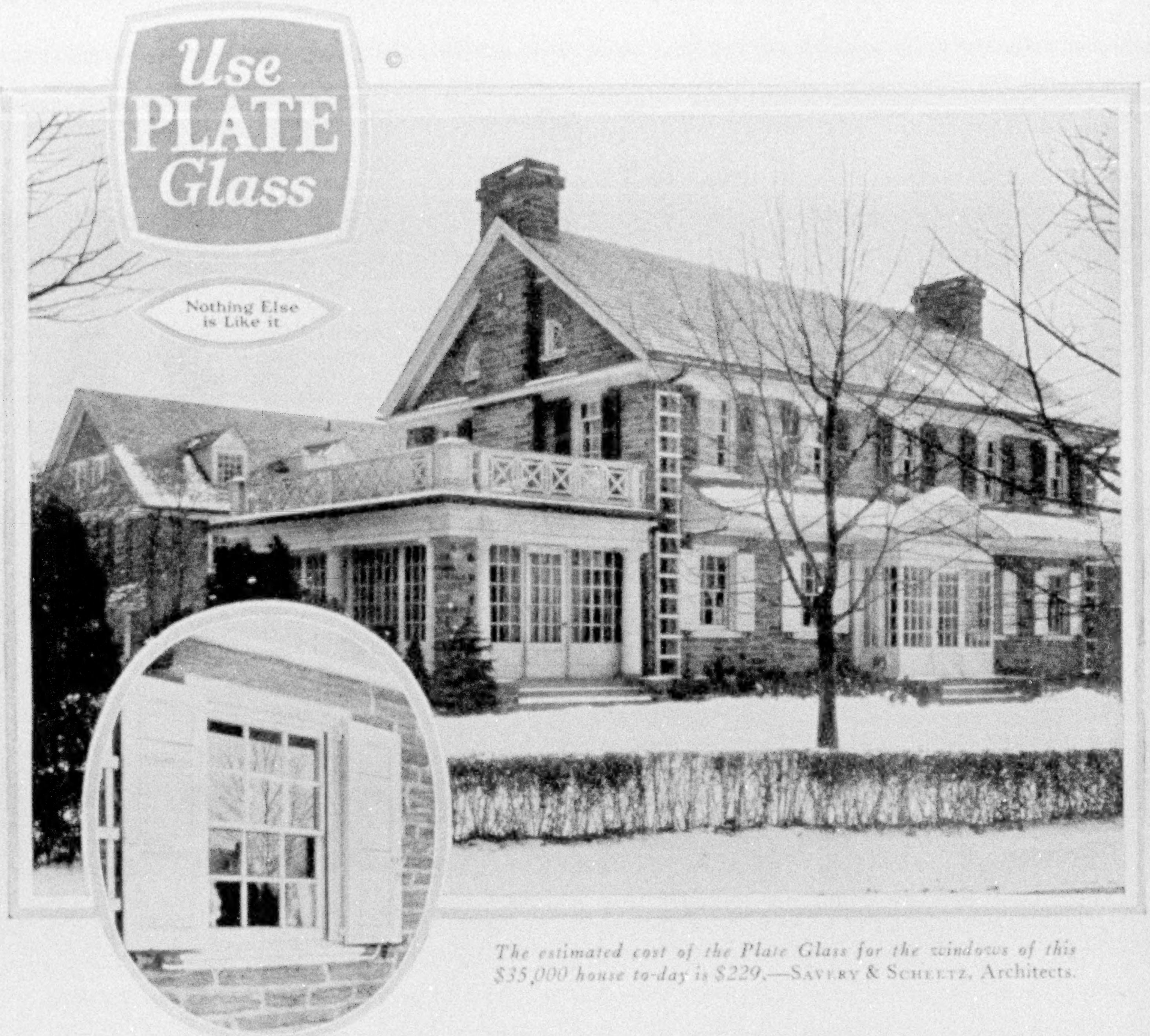

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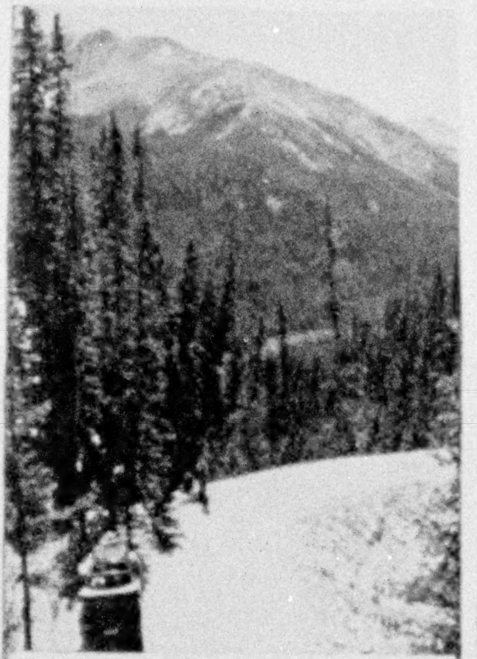

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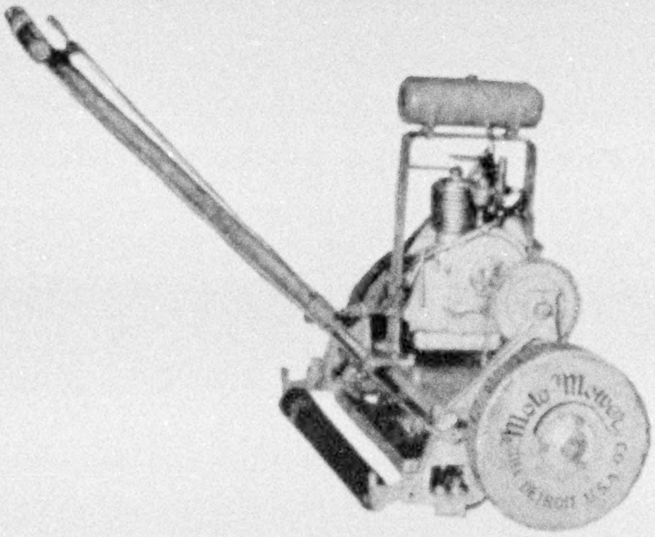

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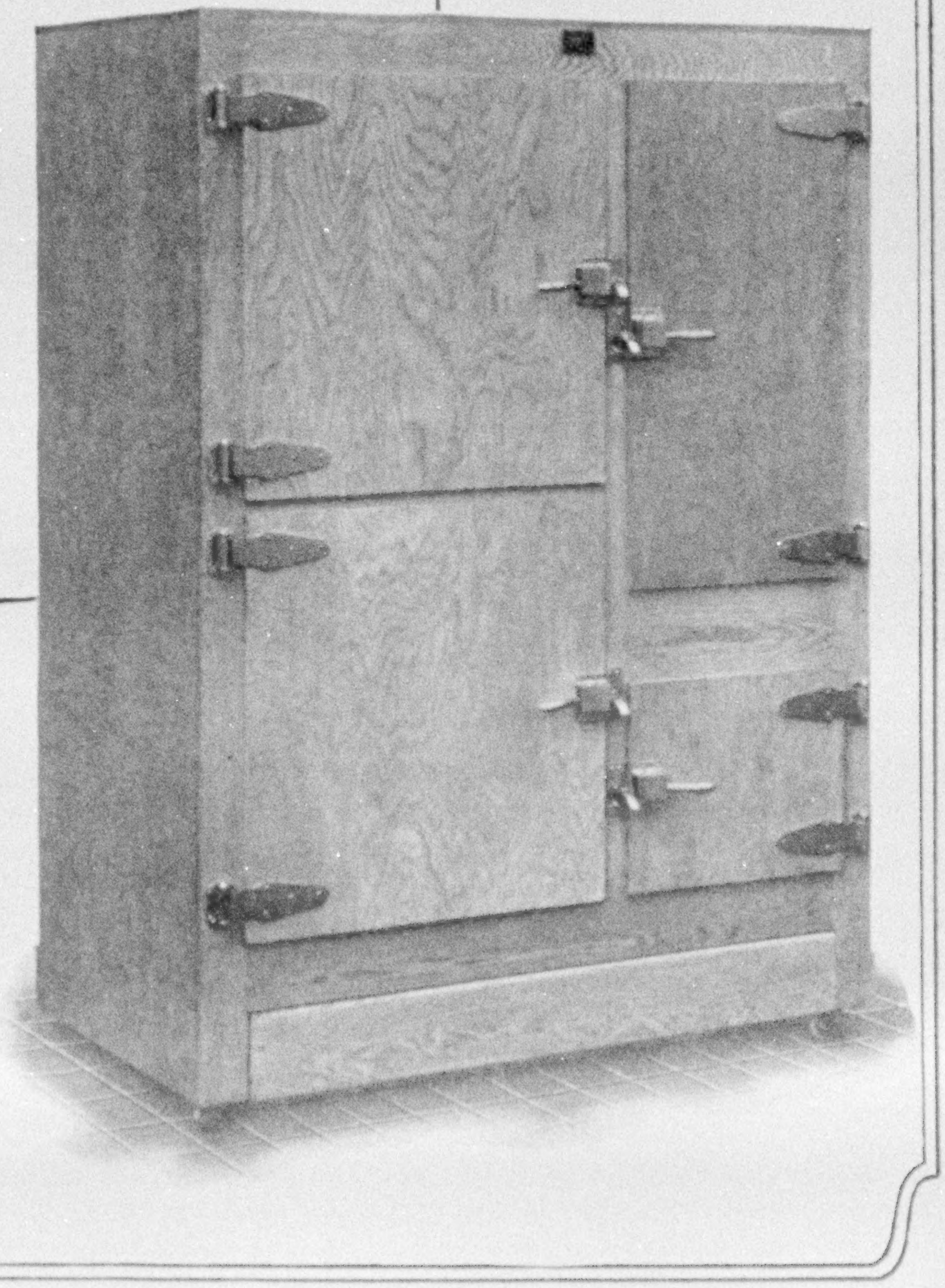

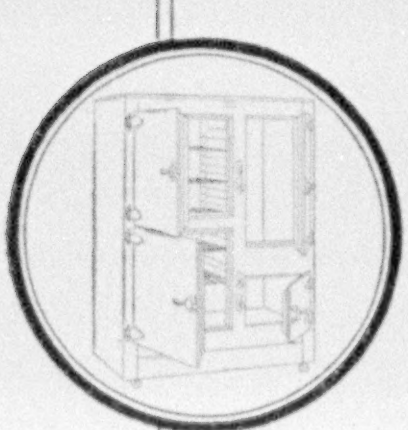

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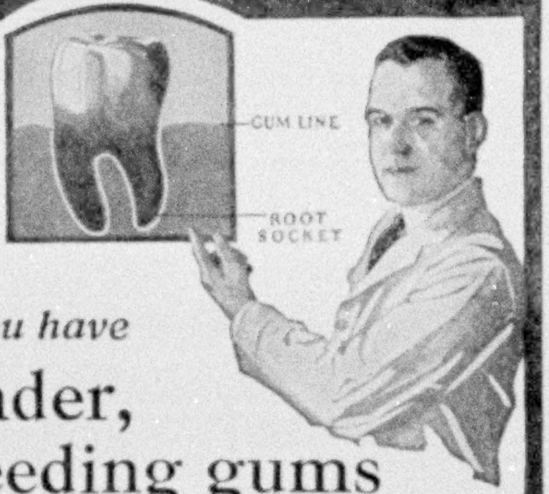

If you have

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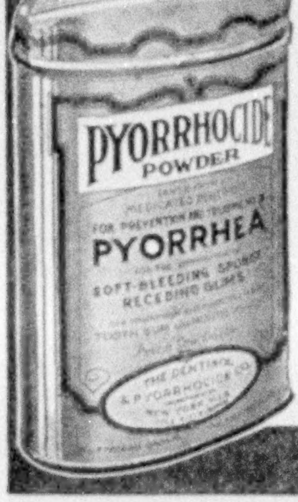


Pyorrhocide Powder has tonic and healing qualities. It helps healthy gums to keep healthy. It keeps the teeth white and clean. Its daily use, with proper dental care, protects you from pyorrhea.

You can buy Pyorrhocide Powder at all druggists. The economical dollar package contains 6 months' supply. Send now for sample—also booklet on causes, effects and prevention of pyorrhea.

The Dentinol &
Pyorrhocide Co., Inc.
Sole Distributors
1478 Broadway
New York City

A Garden Full of Dahlias for $3.50

New and Rare Exhibition Dahlias

Few flowers, whether used for garden decoration or principally for cut blooms to decorate the home, are as responsive to simple garden culture as our Modern Dahlia. It has made wonderful advancement in size of bloom, habit of growth and profuse blooming qualities.

In order to further its now great popularity, we are offering this collection of

12 Dahlia Tubers for $3.50

—one each of 12 distinct varieties, not labelled, which if purchased separately according to name would cost not less than $10.

Order Your Tubers Now so as to have them ready to plant any time after the tenth of May or when all danger of frost is past.

Mail this advertisement with check, money order, cash, or stamps, and secure this exceptional collection, sent prepaid to any point in the United States.

Our 1924 Spring Seed Annual sent on request

Stumpp & Walter Co

30 and 32 Barclay Street New York

EUROPE

Attractive Tours at Reasonable Rates

Frequent Sailings, Most Complete Itineraries

One of the oldest Travel Organizations in the world. 49 years of satisfactory travel experience and permanent offices in Europe assure our clients many advantages.

Our Tours have no equal—the personal attention we give each Tour guarantees the best of service throughout.

Send for "Book K" for Details and Rates

ANNUAL MEDITERRANEAN CRUISE
JANUARY 29, 1925—NEW CUNARD S. S. "SCYTHIA"

FRANK TOURIST CO.
542 Fifth Avenue, New York
219 S. 15th St., Philadelphia. 582 Market St., San Francisco
Paris *Est. 1875* *London*

To Display Unmounted and Unframed Pictures

Beautiful color prints, photographs, charts and maps, even unframed, make ideal wall decorations when properly displayed. You will not injure the subject, the wall-paper, plaster or woodwork when you fasten them up with

Moore Push-Pins

"Glass Heads—Steel Points"

For heavy framed pictures, mirrors, etc., use

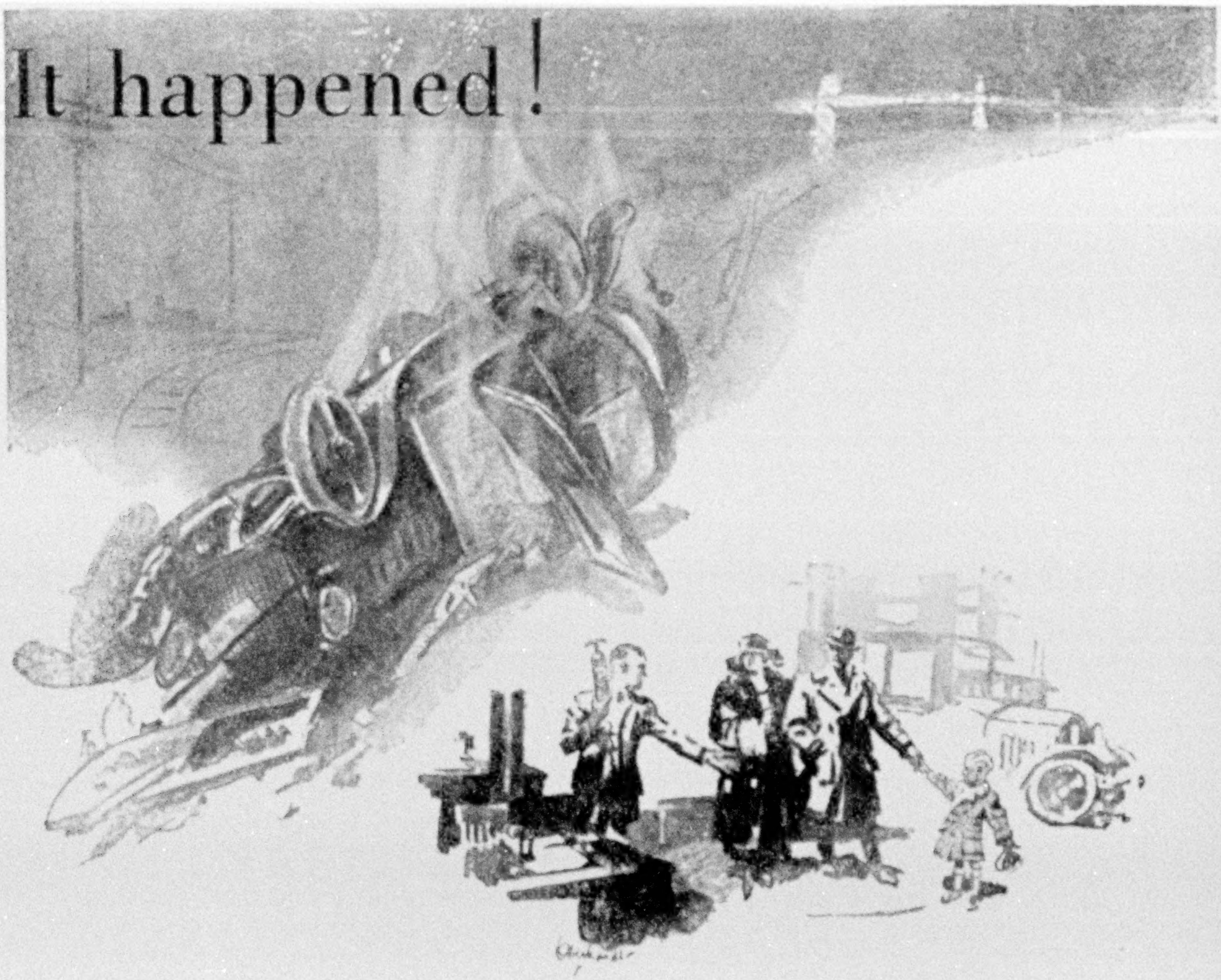
Moore Push-less Hangers

"The Hanger with the Twist"

10c. pkts. Sold everywhere. In Canada, 15c.

MOORE PUSH-PIN CO.
(Wayne Junction) Philadelphia, Pa.

It happened!



The first ride in your new closed car might prove to be the last if you started without Pyrene protection.

• • •

New cars are just as likely to skid or be hit by other cars and "turn turtle" as are old cars. When a car turns over and the doors jam, there is no method of escape and fire may start instantly.

With a Pyrene you can put out that fire at its start and save yourself and your car. Have a Pyrene in your new car before you take your first ride.

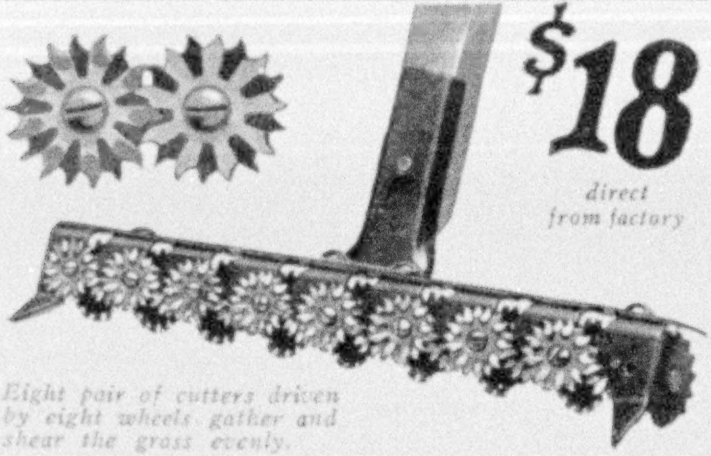
Sold by garages, automobile, hardware and electrical supply dealers

PYRENE
MANUFACTURING COMPANY
Makes Safety Certain
NEWARK, NEW JERSEY

Pyrene
KILLS FIRE
SAVES LIFE

PYRENE SAVES 15% ON YOUR FIRE INSURANCE PREMIUM

MONTAMOWER



$18
direct from factory

Eight pair of cutters driven by eight wheels gather and shear the grass evenly.

The First Really New Lawnmower for Generations

Ten years of experiment and development were necessary to perfect MontaMower. Simple, durable, built to give satisfaction and long service. Light—handles as easily as a rake. Weighs only 7½ lbs.—operated by a woman or child without effort—practically noiseless.

Trims and Cuts at Same Time

MontaMower is so designed that it cuts right up to walls, trees, etc.—no fringe left—no handwork necessary. Cuts grass perfectly—leaves no marks or ridges—does not pick up sticks or stones. Thousands of satisfied owners.

Easily Kept Sharp

MontaMower cutters resharpen themselves like scissors—they will last from two to four years. At end of that time cutters can be replaced by new ones at no more expense than sharpening ordinary lawnmower.

The MontaMower has one qualification in common with ordinary lawnmowers. It will not operate satisfactorily in wet, swampy places nor in loose sand. The best results are obtained by cutting the grass when it is fairly dry.

Order a MontaMower Today

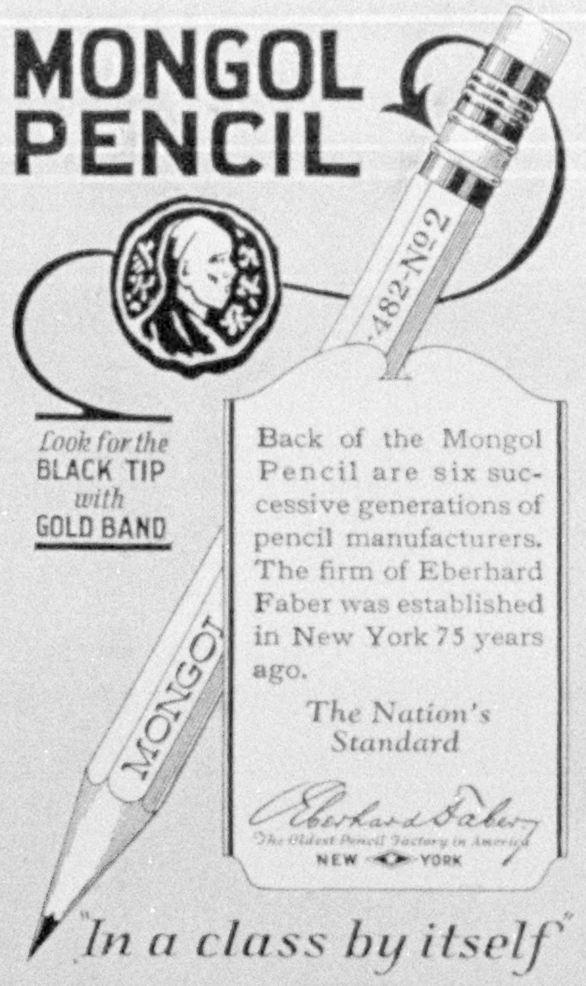
Send check or draft for $18 direct to factory. Guaranteed to be as represented or money refunded. Delivery charges prepaid if remittance accompanies order. Delivery guaranteed on date specified in your order.

MONTAGUE MFG. CO.
148-152 Louis St. GRAND RAPIDS, MICH.
Export Dept., 19-25 West 44th St., New York City

Enclosed find remittance of $18.00. Please send one MontaMower to this address on or

about ....
Name..
Address..

MONGOL PENCIL



Look for the
BLACK TIP
with
GOLD BAND

Back of the Mongol Pencil are six successive generations of pencil manufacturers. The firm of Eberhard Faber was established in New York 75 years ago.

The Nation's Standard

Eberhard Faber
The Oldest Pencil Factory in America
NEW YORK

"In a class by itself"

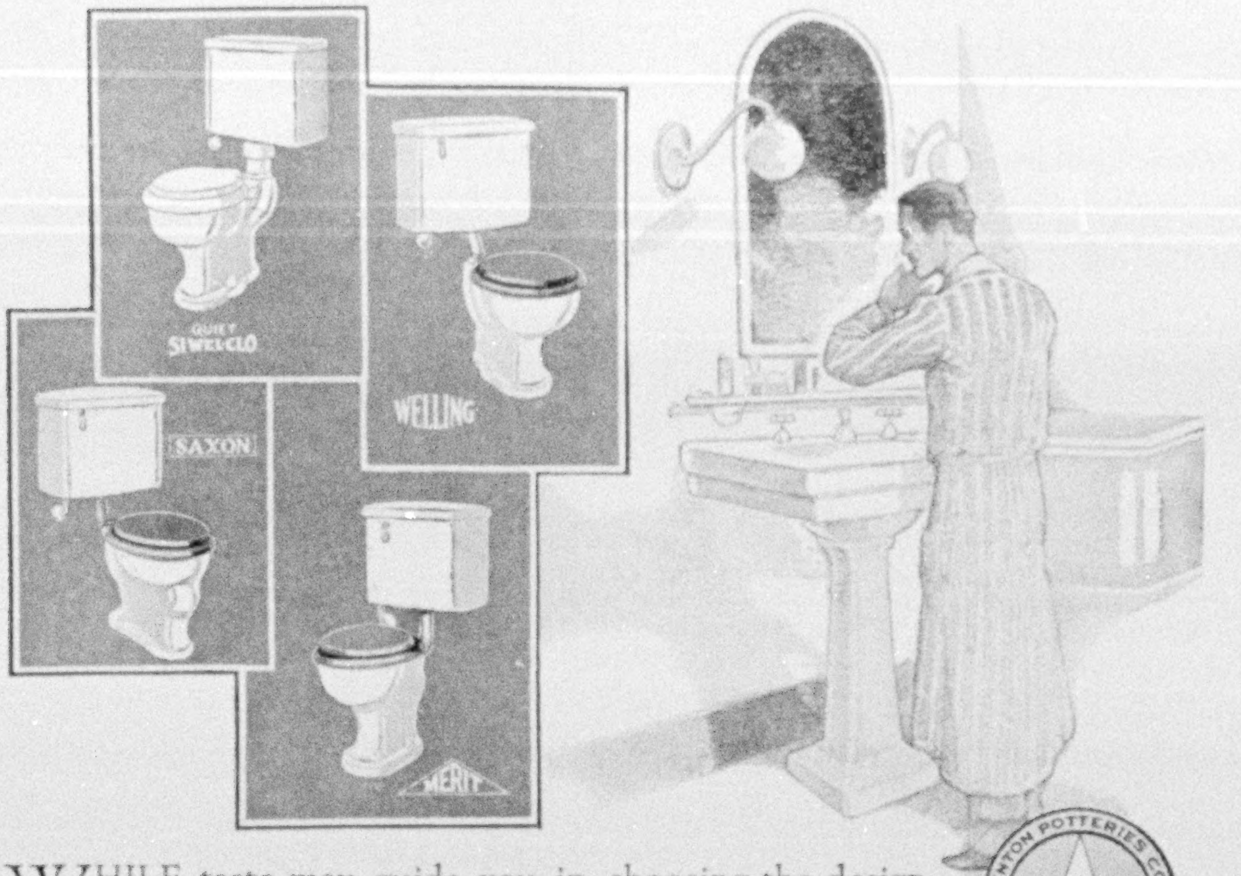
alone *in its work*

Nothing else will do the work of Sani-Flush. It cleans toilet bowls. Removes every stain. No scrubbing. Simply sprinkle into the bowl, follow directions on the can, and flush. The porcelain shines. The hidden, unhealthful trap is also cleaned, made sanitary. Sani-Flush destroys all foul odors. It will not harm plumbing connections. Always keep Sani-Flush handy in the bathroom.

If not at your grocery, drug or hardware store, send 25c for a full-size can.

THE HYGIENIC PRODUCTS CO.
Canton, Ohio

Sani-Flush
Reg. U.S. Pat. Off.
Cleans Closet Bowls Without Scouring



TEPECO

WHILE taste may guide you in choosing the design of bathtub or lavatory, the sanitary importance of the water closet is such that it is best to rely upon the judgment of a reputable manufacturer.

One of good quality is a protection against foul air, sewer gas and disease germs. It is a protection against repairs to tank and fittings. "Tepeco," the world's largest maker of All-Clay Plumbing Fixtures, offers for residential purposes the four recognized types—each in its class, and at its price the best that can be made. We believe it will pay you to install one of them.

"Si-wel-clo"	$97.50
"Welling"	60.50
"Merit"	51.00
"Saxon"	45.50

F. O. B. *Trenton, N. J.*

Send for our free Plan Book—"Bathrooms of Character" S-4

THE TRENTON POTTERIES COMPANY
TRENTON, N. J., U. S. A.
NEW YORK BOSTON SAN FRANCISCO

TEPECO Water Closets
FOR EVERY PLACE AND PURSE

THIS MAGAZINE IS FROM OUR PRESSES

JUDD & DETWEILER, INC.
Master Printers

ECKINGTON PLACE AND FLORIDA AVENUE WASHINGTON, D. C.

Whatever Your Question;—be it the pronunciation of **Fascista**, the spelling of a puzzling word, the location of **Esthonia** the meaning of **soviet, realtor, vitamin,** etc., this **Supreme Authority**—

WEBSTER'S NEW INTERNATIONAL DICTIONARY

contains an accurate, final answer. 407,000 Words 2700 Pages 6000 Illustrations.
Regular and India-Paper Editions
G. & C. MERRIAM CO., Springfield, Mass.
Write for specimen pages, prices, etc. and FREE Pocket Maps per Natl. Geo.

"Old Town Canoes"

Push across
to the bathing beach

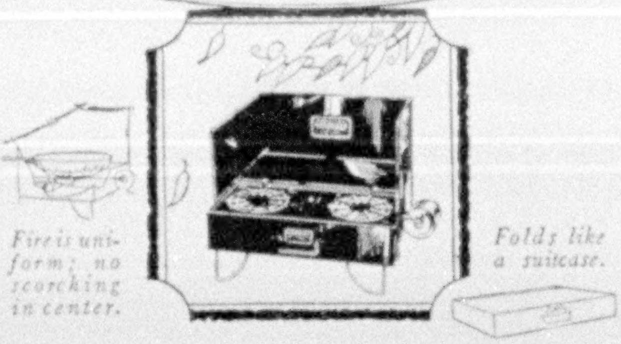
DOWN by the wooded bank, a stone's throw from the cabin, an "Old Town Canoe" is moored. What a trim, graceful craft it is.

Each "Old Town" model is patterned after a real Indian canoe. "Old Towns" are light and steady. They are low in price too. $64 up. From dealer or factory.

The new 1924 catalog is beautifully illustrated. It shows all models in full colors. Write for your free copy to-day.

OLD TOWN CANOE CO.
425 Middle St., Old Town, Maine, U. S. A.

AMERICAN
KAMPKOOK
USED BY MORE THAN A HALF MILLION CAMPERS


Fire is uniform; no scorching in center.
Folds like a suitcase.

Your Vacation Friend

A friend is wholly dependable; always gives his best and does his utmost to lighten your burden. *Kampkook* is a real friend to out-o'-doors folks.

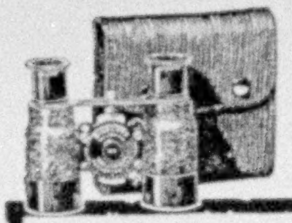
Folds like a miniature suit case—compact and handy to carry in the Rolls Royce or Ford.

Set up in a jiffy, burns motor gasoline with all the convenience, speed and cleanliness of your kitchen range. Exclusive ring burner gives a well spread uniform fire protected by a folding adjustable wind shield.

This vacation take this friend with you.

Four models, $7.50 to $15.00 at your dealers. Catalog free.

AMERICAN GAS MACHINE CO., Inc.
834 Clark Street, Albert Lea, Minn.



AS SEEN THROUGH THE BIASCOPE

BIASCOPE $5
Pocket Binocular

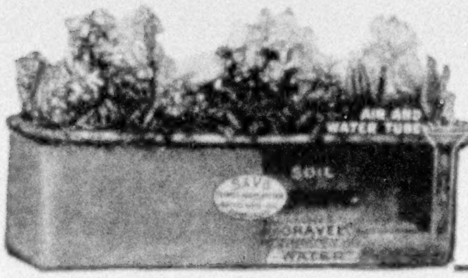
Makes a "close-up" of objects invisible to the naked eye.

$5 at dealers. Direct postpaid $5.25
Money back guarantee. Circulars free.

Wollensak Optical Company
Rochester, N. Y.

THE
GLEN SPRINGS
WATKINS GLEN, N.Y.
ON SENECA LAKE
William E. Leffingwell, President

Offers Intelligent Rest in invigorating atmosphere, amid scenic beauties of glorious Finger Lakes Region. Sporty golf course. Tennis, boating and other outdoor sports. Every form of hydrotherapeutic treatment. Open all year. Booklets on request.



SAVO Flower and Plant Box

MAKES POSSIBLE BEAUTIFUL, ALL-YEAR AROUND GARDEN

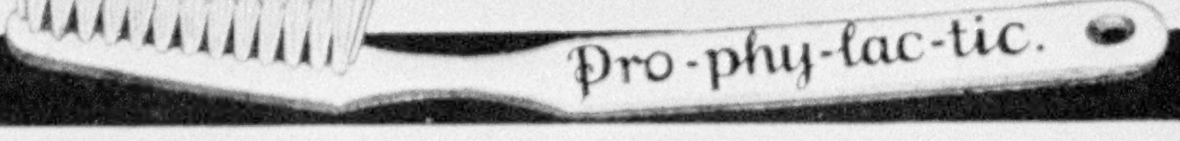
Self-Watering
Sub-Irrigating
Leak-Proof
Rust-Proof
Six Sizes

SAVO Steel Boxes are ideal for windows, porches, ledges, sun parlors, etc. Perfect circulation and drainage. Beautiful finishes. Durable; artistic. SAVO boxes are not to be compared with ordinary, cheaply-made metal boxes.

WRITE FOR CATALOG

SAVO MFG. CO.—Dept. W—111 W. Monroe St., Chicago, Ill.

Clean the back teeth—The large end tuft cleans even the backs of the back teeth


Pro-phy-lac-tic.

Elto

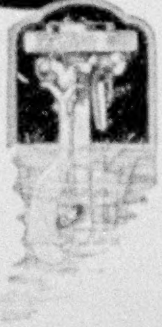
The FASTEST
LIGHT TWIN

Designed and
Built by
Ole Evinrude

Weighs Less Than 17 lbs. per H.P.

Ole Evinrude builds the lightest 3 H. P. motor made. He could as easily build the lightest 1 H.P. or 2 H. P. motor. But he knows that less than 3 H. P. is not enough for the speed you want or the safety you have a right to expect in rough waters, or with heavy loads. In the Elto Twin you get not only ease in carrying, but one half more power and much more speed.

"STARTS with a TOUCH"



No other outboard motor gives you instant starting every time, and safe rudder steering, leaving both hands free to troll or cast. The Elto is the safe family motor. No danger of sudden capsizing of boat while reversing. Weed-free self-tilting propeller. Trouble proof carburetor. The Elto fits in carrying case without taking apart. Write for free catalog.

Elto Outboard Motor Co.
Manufacturers' Home Bldg. (2)
Dept. 44 Milwaukee, Wis.

---

ventilating screen lets the air in

For Sports!

This cap will help you keep cool-headed. The ventilator lets the fresh air circulate inside your cap. Keeps your head cool. Helps you to play better. From $2 to $5. At fine stores. For names of dealers nearest you, address us at
210 Fifth Ave., N. Y.

Merton-Air

REG. U.S. PAT OFFICE

The AIR COOLED CAP

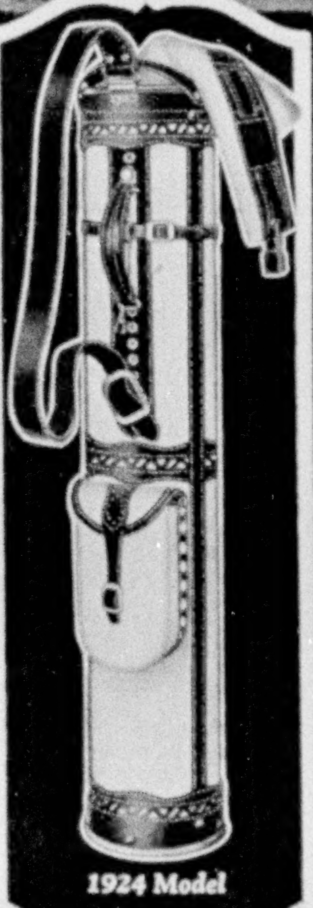
The New 1924

BUHRKE

TRADE MARK REGISTERED

Pronounced BURR-KEY

Golf Bag



1924 Model

BUHRKE
Metal Bottom
"Look for the name and the red tag"

THE free, easy, *confident* style of a Class-A golfer is largely due to well-coordinated, unwearied muscles. The efficient design of the new model Burr-Key Golf Bag—

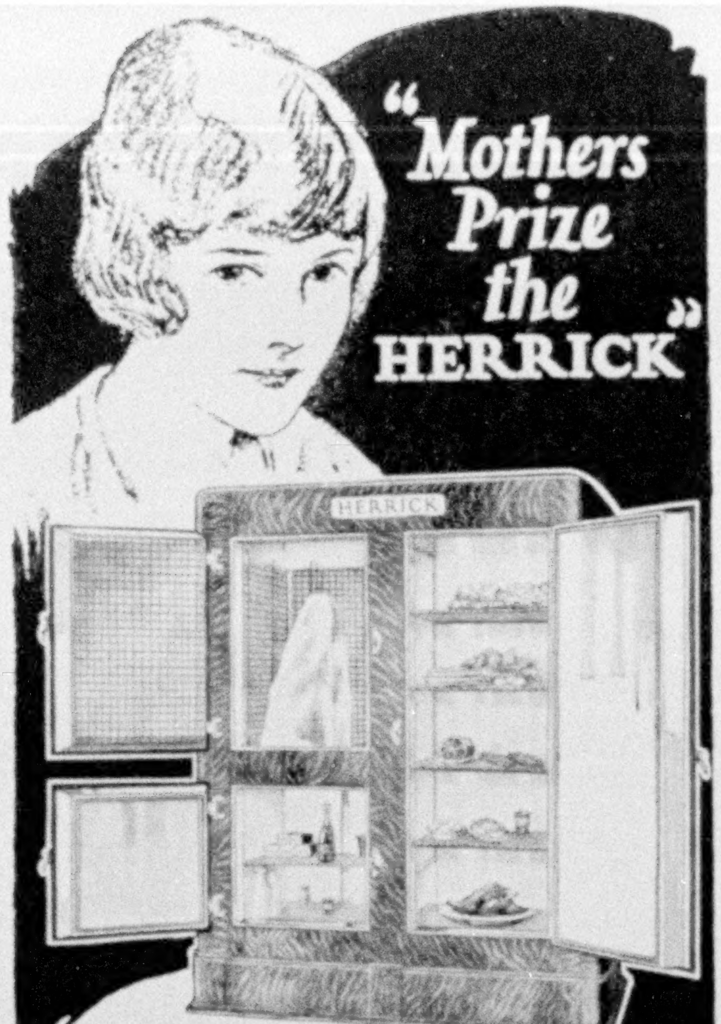
Equipped with the
IMPROVED BURR-KEY
Adjustable Handle and Metal Top

—enables you to carry it without the least contraction or strain of arm, shoulder, or wrist.

Other exclusive Burr-Key features are the Metal Bottom, Locked Pocket, Towel Clip, New Shoulder-Strap Fastener and Partition Arrangement.

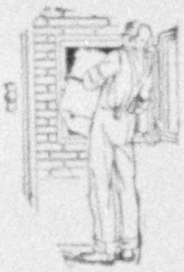
For Sale by Dealers Everywhere

R. H. BUHRKE CO.
(Established 1877)
1238-1250 Fullerton Avenue - Chicago
New York Office and Showroom: 258 Broadway
Manufactured in Canada by Woods Manufacturing Co., Ltd.
Ottawa, Montreal, Toronto and Winnipeg



Always Dry Sweet and Clean

The HERRICK brings freedom from worry about food spoilage. Moisture cannot form in a well-iced HERRICK. Its constant cold air circulation prevents odors, taint or decay. It is easy to clean and inexpensive to ice.



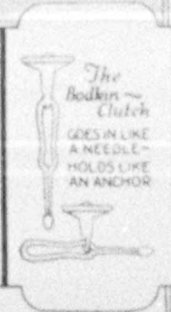
HERRICK
Outside Icing
for convenience
and economy

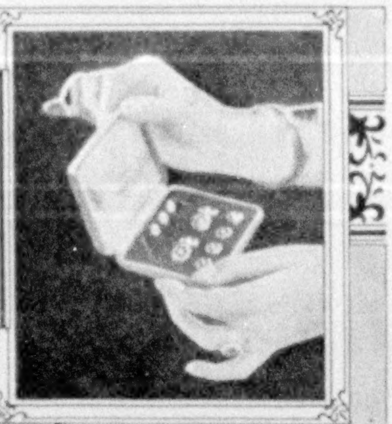
HERRICK OUTSIDE ICING permits regular icing without bothering the housekeeper and without "tracking up" the kitchen floor. It affords iceless refrigeration in cool weather. The HERRICK *Water Cooler* attachment provides ice water—untouched by ice—at the turn of a faucet. Connects with your regular water supply.

Send for free booklet, "Getting the Most from Your Refrigerator"

HERRICK REFRIGERATOR COMPANY
205 River Street, Waterloo, Iowa

Food keeps BEST *in the*
HERRICK
THE ARISTOCRAT OF REFRIGERATORS


The Bodkin-Clutch
GOES IN LIKE A NEEDLE—HOLDS LIKE AN ANCHOR



See that it is correct!

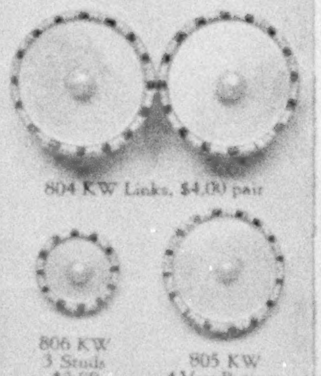
For full dress or tuxedo, his jewelry should be Krementz—it is correct. Much annoyance and time are saved through the convenience of the bodkin-clutch back on the studs and vest buttons,—easily inserted, it holds securely.

At better dealers. Write for style booklet. Address us, please, at Newark, New Jersey.

Krementz

COLLAR BUTTON 25 CTS EACH

Full Dress Set in Mother-of Pearl with whole pearl centers. Complete in box, $11.00



804 KW Links, $4.00 pair

806 KW
3 Studs
$3.00

805 KW
4 Vest Buttons
$4.00

CORRECT JEWELRY FOR MEN

YOSEMITE
All year 'round National Park!

—*in California*—

Every month in the year Yosemite National Park—between San Francisco and Los Angeles—extends its welcome to all travelers to enjoy the exceptional beauty and majesty of its world-famous scenery—its motor tours, trail riding, summer and winter recreations, and mountain climbing.

The "Y T S" Tour, including 240 miles of motoring in Yosemite's mountains via Yosemite Transportation System, offers a special attraction between June 1 and October 1, reaching all main points of interest—Merced River Canyon, Yosemite Valley, Hetch Hetchy Valley, Inspiration Point, Mariposa Grove of 600 Big Trees, Wawona Point, Glacier Point and Overhanging Rock—at a cost of $35.00 for round trip transportation from Merced, California, where all main line railroad tickets permit free stopovers.

See Yosemite this year. For free Illustrated Descriptive Folder, address Dept. "G"

YOSEMITE TRANSPORTATION SYSTEM
Yosemite National Park, California

Lead makes it safe to telephone even when the lightnings play

WHEN lightning flashes around your house, lead used in a fuse enables you to use your telephone without danger of electrocution.

When a lightning bolt reaches the fuse, it melts the lead of the fuse. This stops the current and prevents it from reaching your instrument.

How lead helps you phone

Every time you telephone you summon the help of lead. In the telephone instrument and box is an average of 51 soldered connections. Lead is in all of them. Exchanges in the United States and telephone lines running out of them have billions of soldered connections, with about 322,000,000 pounds of lead in them.

There are in this country about 82,000 miles of telephone, telegraph, radio and electric light cable covered with lead—327,300,000 pounds of it.

IN telephone systems, you do not see it or realize the important work lead is doing. But in paint, lead in the form of white-lead, the basic lead carbonate, is known the world over.

For generations painters have used white-lead on such surfaces as wood, as standard protection against the assaults of the weather.

Property owners know from experience that white-lead gives the surest protection for the surfaces of their houses. These owners have learned the truth of the words, "Save the surface and you save all." They realize now that the cost of good paint is secondary to protection of the covered surface.

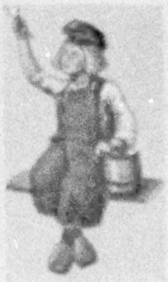
Producers of lead products

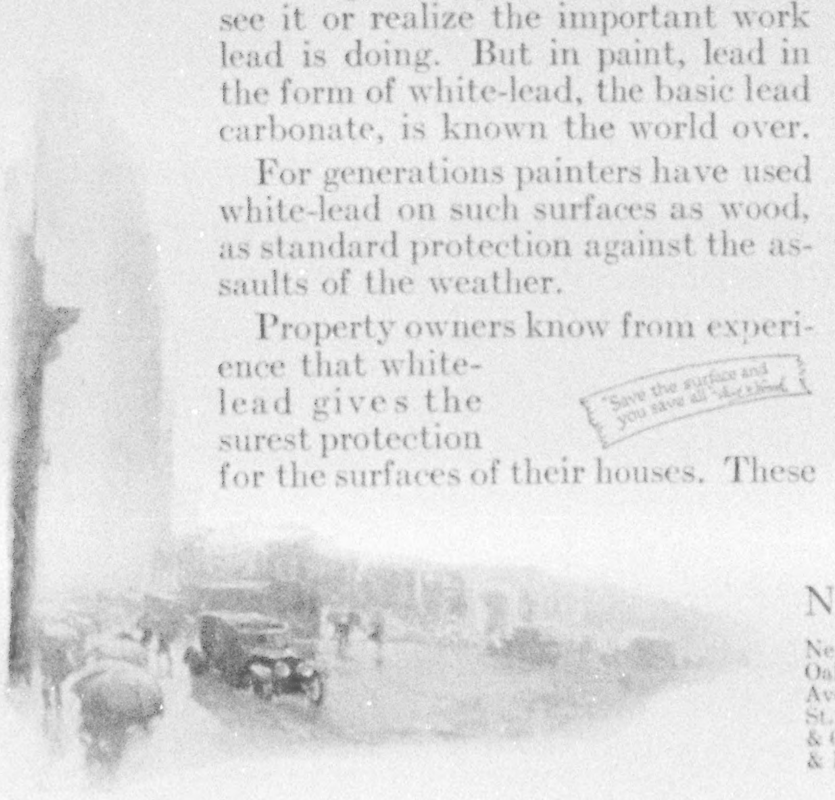
Dutch Boy white-lead is the name of the pure white-lead made and sold by National Lead Company. On every keg of Dutch Boy white-lead is reproduced the picture of the Dutch Boy Painter shown below. This trademark guarantees a product of the highest quality.

Dutch Boy products also include red-lead, linseed oil, flatting oil, babbitt metals, and solder.

National Lead Company also makes lead products for practically every purpose to which lead can be put in art, industry and daily life. If you want information regarding any particular use of lead, write to us.

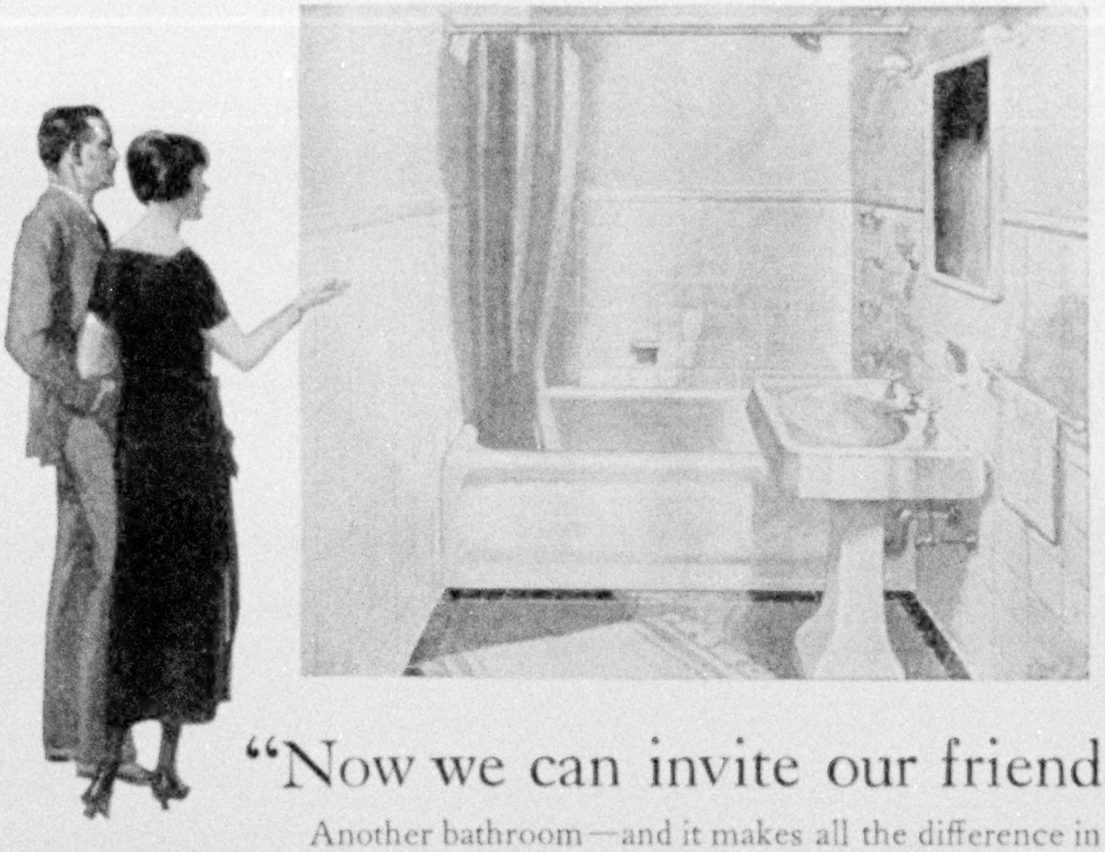
If you wish to read further about this wonder metal, we can tell you of a number of interesting books on the subject. The latest and probably the most complete story of lead and its many uses is "Lead, the Precious Metal," published by the Century Company, New York. If you are unable to get it at your bookstore, write us or the publishers.




"Save the surface and you save all"

NATIONAL LEAD COMPANY

New York, 111 Broadway; Boston, 131 State St.; Buffalo, 116 Oak St.; Chicago, 900 West 18th St.; Cincinnati, 659 Freeman Ave.; Cleveland, 820 West Superior Ave.; St. Louis, 722 Chestnut St.; San Francisco, 485 California St.; Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Ave.; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut St.



"Now we can invite our friends"

Another bathroom—and it makes all the difference in the world! The friends whom one has long wanted to see may be invited at last; without embarrassment or apology. The daily complications and conflicts which have divided a peaceful household are smoothed away. What other investment can surpass these dividends of satisfaction?

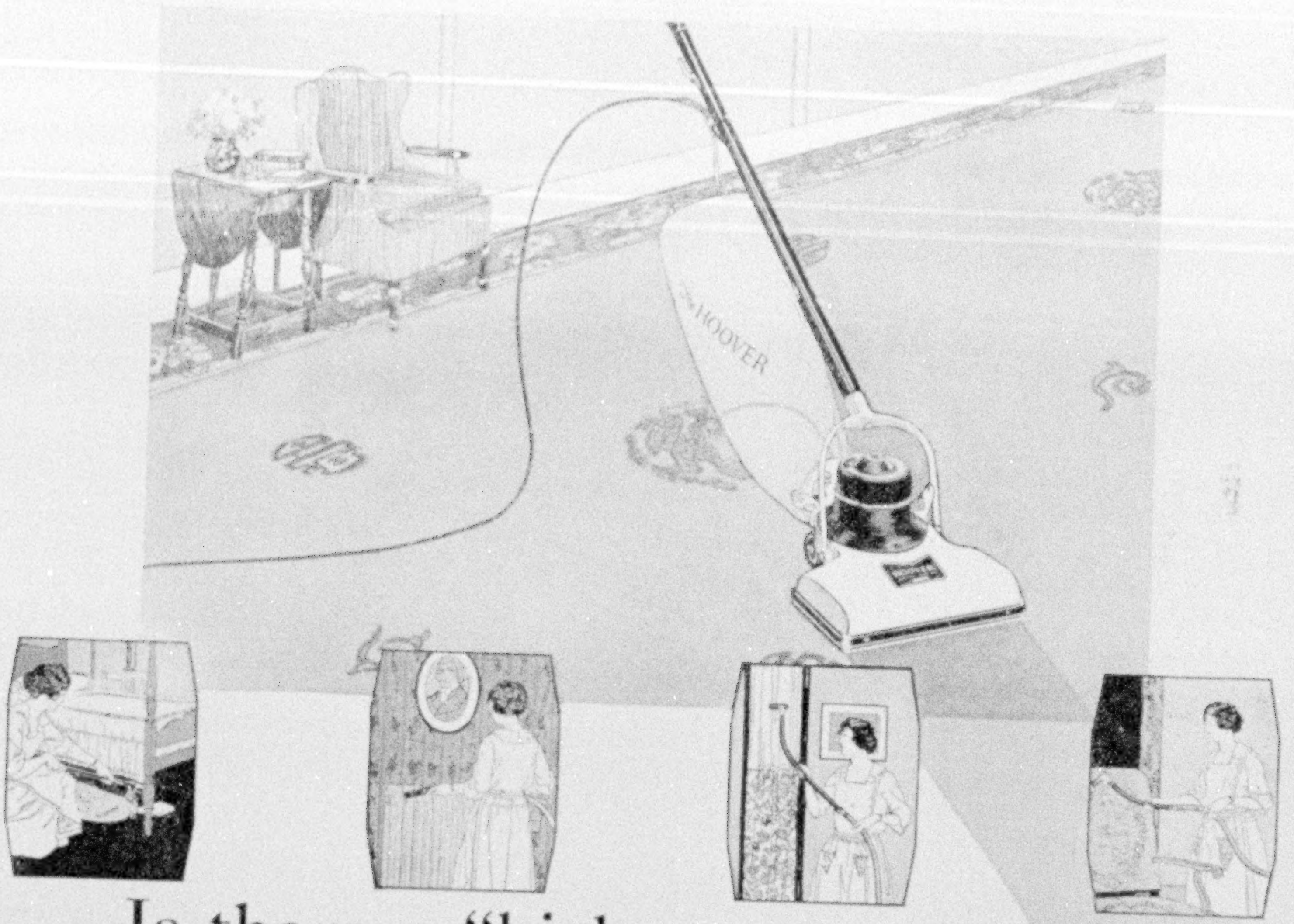
Happily, the solution of the problem of enough bathrooms is usually quite simple. A corner scarcely larger than a good-sized closet will make a delightful bathroom. And if you choose Kohler fixtures you will have the best that money can purchase, at a cost that is really very moderate—much less than you might expect from the high reputation of the half-century-old institution that makes them.

Ask your plumbing dealer for his advice. He can tell you about Kohler Ware and the unique mark that identifies Kohler quality—the name "Kohler" unobtrusively fused into the deep, beautiful, snow-white enamel. . . . . Let us send you the Kohler booklet. It will interest you.

KOHLER OF KOHLER

Kohler Co., *Founded 1873*, Kohler, Wis. *Shipping Point*, Sheboygan, Wis.
BRANCHES IN PRINCIPAL CITIES

MANUFACTURERS OF ENAMELED PLUMBING WARE AND KOHLER AUTOMATIC POWER AND LIGHT 110 VOLT D. C.



Is there a "high water mark" in your household cleaning?

SOMETIMES, after little hands have been washed, there's a shadowy gray line that mother calls the "high water mark."

Mother knows, too, that there are "high water marks" in household cleaning. But she can do no better with the tools she has.

She sweeps her rugs diligently, regularly. But her broom can't sweep out the embedded, sharp-edged dirt. It must be dislodged—*beaten out!*

Not until a Hoover regularly *beats* her rugs will they *actually* be as clean as she may think they are now.

The Hoover also sweeps and air-cleans. What *other* cleaner gives rugs the three kinds of cleaning they *must* have to be thoroughly clean?

With equal ease and thoroughness every article of the household exposed to dust can be brushed and suctioned clean with powerful air suction drawn through efficient, convenient cleaning tools.

Labor and time will be saved. Years will be added to the life of your rugs and furnishings.

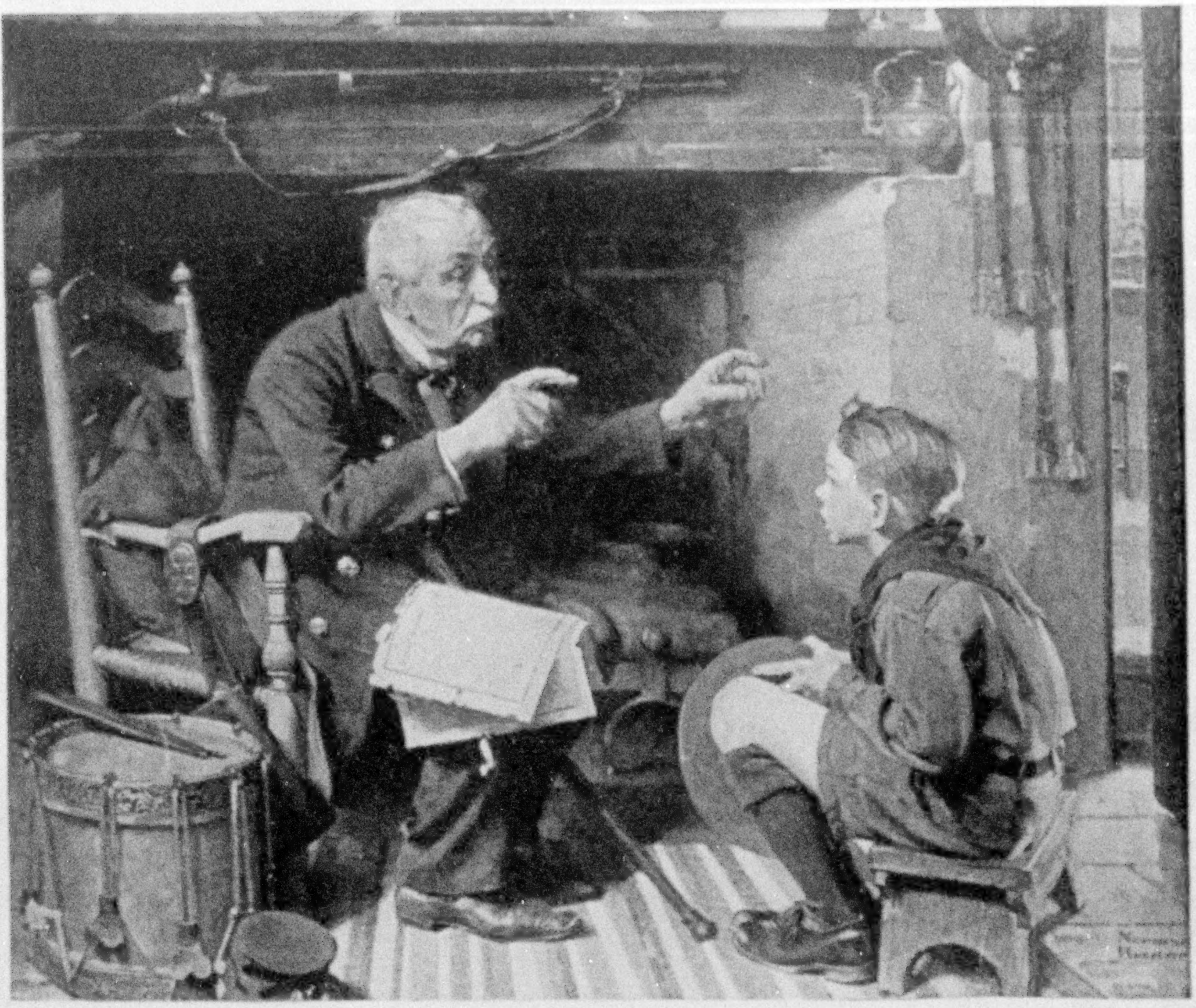
What is all this worth to you? Fortunately you won't have to pay nearly that much! Phone your Authorized Hoover Dealer today. It is so easy to buy the new Hoover, with its ten added features, on the easy payment plan that you'll wonder why you waited so long.

THE HOOVER COMPANY, NORTH CANTON, OHIO
The oldest and largest makers of electric cleaners
The Hoover is also made in Canada, at Hamilton, Ontario

The HOOVER

It BEATS ... as it Sweeps as it Cleans

PRESS OF JUDD & DETWEILER INC.
WASHINGTON, D. C



Painting by Norman Rockwell

If Your Wisdom Teeth Could Talk They'd Say, "Use Colgate's"

This Dentifrice Does Not Scratch Enamel

Every good scout brushes his teeth regularly after each meal and just before going to bed. Colgate's is the safe dentifrice to use.

"Be good to those teeth of yours, my boy, and they'll be good to you. "Good health is a blessing—you'll find that out as you grow older—and good teeth are important to good health."

* * *

Sound advice that, for every one to follow, if sound teeth through a healthy lifetime are desired.

Colgate's is the safe dentifrice to use because it contains no grit*—it "washes" and polishes; doesn't scratch or scour your thin tooth enamel. Grit is dangerous, for tooth enamel, once marred or worn down can never be replaced. Neither can its natural beauty be restored.

The Colgate habit is a health and beauty habit, easy to form and safe for a lifetime.

Large tube, 25c—at your favorite store.

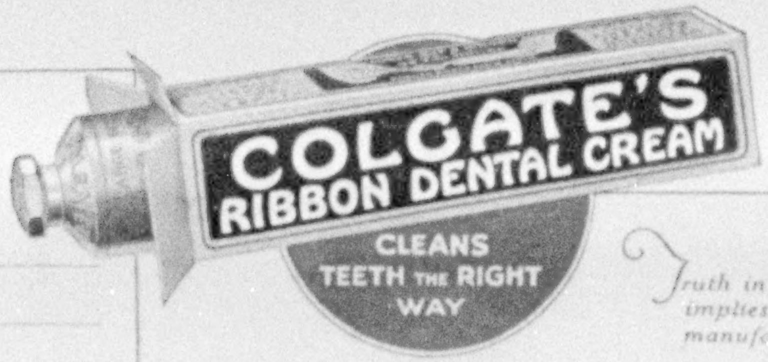
* The U. S. Public Health Service in its book "Good Teeth," Keep Well Series No. 13, 1921, warns against grit in dentifrices.

COLGATE & CO.,
Dept. 66, 199 Fulton Street,
New York City:

Please send me, free, a trial tube of Ribbon Dental Cream.

Name

Address



Truth in advertising implies honesty in manufacture